

Section IV

Oral Health Promotion/Disease Prevention

Table of Contents

How to Use the OHP/DP Section	
Community-Oriented Primary Care Model	
The Community-Oriented Primary Care Model	
Implementation of a Community Oral Health Plan	
Community Oral Health Education	
Prevention and Control of Oral Disease	
Dental Caries Prevention and Control	
Caries Diagnosis, Risk Assessment, and Management.....	
Use of Fluorides in a Public Health Program	
Community Water Fluoridation.....	
Recommendations for Fluoridated	
Community Water Systems	
School Water Fluoridation.....	
Dietary Fluoride Supplements	
Topical Fluorides	
Pit and Fissure Sealants	
Nutrition and Dental Caries	
Baby Bottle Tooth Decay/Early Childhood Caries.....	
Periodontal Disease Prevention and Control	
Risk-Based Approach to Periodontal Disease	
Prevention and Treatment	
Periodontal Disease Treatment Protocol for Individuals	
with Non-Insulin Dependent Diabetes Mellitus	
Oral and Oropharyngeal Cancer:	
Prevention and Early Detection	
Oral Health Education and Promotion	
Introduction.....	
Head Start.....	
School Programs	
Traumatic Injury/Accident Prevention.....	
Child Abuse and the Mandated Reporter	

Evaluation of Oral Health Promotion/Disease Prevention Programs

Introduction.....	
Quality Assessment of Oral Health Promotion/ Disease Prevention Programs.....	
Documentation of Clinical and Community Preventive Services.....	
Clinical Preventive Services.....	
Community-Based Prevention Activities	

Monitoring of Oral Health Objectives for American Indians

and Alaska Natives	
--------------------------	--

How to Use the OHP/DP Section

As oral diseases continue to be a significant health problem in the American Indian/Alaska Native (AI/AN) population, health promotion/disease prevention must play a key role in improving the oral health of this population. This section of the *IHS Oral Health Program Guide* is intended for use by all oral health care providers. Please use the information and provide feedback to the Director, IHS Dental Disease Prevention Program, so that it can remain a dynamic document. References are made to the IHS quality assurance standards where applicable.

This section is divided into five topics. The first topic discusses community development. The IHS Dental Program has adopted a philosophy of Community-Oriented Primary Care (COPC) to assess the health status and needs of a defined population in a community in order to better manage resources based upon the situation in each community. Also included is information on how to develop a community prevention plan and examples based upon the POARE format.

Community
Development

The second topic describes the prevention methods for lowering disease rates for dental caries, periodontal disease, and oral cancer and for decreasing the use of tobacco. A section on caries diagnosis, risk assessment, and management of dental caries is included. Treating the caries process as an infectious disease and applying a medical model to eliminate or reduce the bacteria are program strategies described in this section. Proven effective preventive strategies for caries control include use of dental sealants and systemic and topical fluorides. Information on some practical suggestions related to nutrition and dental caries that dental staff can share with patients, caregivers of young patients, and with other health professionals is also included. The strategies include encouraging patients to follow the Food Guide Pyramid. Baby Bottle Tooth Decay/Early Childhood Caries is a common problem at IHS facilities. Strategies for preventing this condition are presented for both clinical and community settings.

Prevention
Methods

Recent oral health surveys conducted by the IHS have indicated a high prevalence of periodontal diseases throughout AI/AN populations. Much of this disease can be contributed to the high rates of non-insulin dependent diabetes mellitus (NIDDM) in the population. The latest techniques in controlling and treating periodontal disease with chemotherapeutic measures is included in the section. By identifying and providing treatment to those patients at high risk, resources can be used most effectively. Specific treatment protocols for patients with NIDDM are also presented in this section.

Although oral cancer rates are generally low in Indian populations, with the exception of Alaska Natives, the use of commercial tobacco products is extraordinarily high—particularly in Northern Plains Indians and Alaska Natives. Use of tobacco (and alcohol)

place these populations at high risk for oral and oropharyngeal cancers. Strategies on early detection and education are presented.

Oral Health
Education
Programs

The third topic is oral health education programs. Examples of oral health education programs in Head Start and school-based settings are included.

Program
Evaluation

The fourth topic is program evaluation. Evaluation is a critical aspect of the HP/DP program and ensures that resources are used wisely. Examples of quality assessment methods for clinic- and community-based programs and activities are provided. Documentation techniques individual preventive services and community-based programs are included, as is a brief description of the POARE planning model.

Oral Health
Monitoring

The fifth and final topic deals with the monitoring of oral health. Congress and the IHS Dental Program have selected oral health objectives from the “Year 2000 Oral Health Objectives For the Nation.” Using a set of dental procedure codes and a monitoring module contained in the DDS package, it is possible for local programs to monitor progress toward meeting these objectives. An explanation of the 437 oral health objectives monitoring module is also included.

Additional
Resources

Overall, the goal of improving the oral health of AI/AN people depends on changing behaviors, increasing access to care, and embracing the latest technologies for health promotion/disease prevention in both clinic and community settings. If you would like more information on HP/DP, contact your Area Dental Consultant, Area Prevention Officer, or the Director, Dental Disease Prevention Program at HQ West (505-248-4175).

The Community-Oriented Primary Care Model

The World Health Organization defines Primary Health Care this way: “Primary health care is essential health care based on *practical, scientifically sound, and socially acceptable* methods and technology, made *universally accessible* to individuals and families in the community through their *full participation* and at the *cost that the community and country can afford* to maintain at every stage of their development in the *spirit of self-reliance and self-determination*.” The Indian Health Service (IHS) utilizes the World Health Organization’s definition of Primary Health Care in their Community-Oriented Primary Care (COPC) Programs. In addition, COPC is a health delivery concept which *integrates all health disciplines and community resources* in order to address the health problems identified within the community. This concept thus extends primary care outside the clinic and acknowledges that to achieve improved health in a community, both technical expertise of the health practitioners and cultural and social experts from the community must be involved.

Primary
Health Care

There are three essential elements of COPC. First, there must be a definable community. If the people of a town, region, or locale cannot be identified and have no characteristics that join them together as a community, a COPC program cannot be accomplished. Second, an integrated health care delivery program within the community must be present. Third, a management process by which the health care program identifies and addresses the major health problems of the community must be available. In addition, the management process must function with the participation of the community.

COPC Elements

In IHS, Tribal, and Urban Indian (I/T/U) programs, defined communities and integrated health care delivery programs generally exist and have been present for many years. In so much as that is true, the focus here is on the third essential element of COPC, the management process. The management process of COPC consists for four functional steps:

COPC
Management
Process

- Define the community.
- Identify the health problems of the community.
- Develop a health care program to address the identified health problems.
- Monitor the efficiency and effectiveness of health care program modifications.

1. Define the Community

In I/T/U programs the definition of community is usually a Tribe or collection of Tribes within the confines of a reservation or service delivery area. The community can also be extended to a geographic region, such as an IHS Area, and can include Urban settings. Further, definition of the community also includes its characterization by demography, socioeconomic status (SES), and the way the community makes decisions based on these factors. Definition of the community includes identification of community opinion leaders, accepted community programs such as Head Start, and an understanding of how the community makes decisions that affect its members.

2. Identify the Health Problems of the Community

Identification of the health problems of the community requires input from the health care provider, epidemiological surveys of the community, and the perception of the community. There are a number of community groups and individuals that can and should be involved in this process. Some of them are listed here:

Involved
Community
Groups and
Individuals

Tribal Council
Tribal or Urban Indian Health Board
Local Opinion Leaders (usually elders)
Head Start
Local Schools
Women, Infant, and Children (WIC) program
Community Health Representatives
Public Health Educators
Maternal and Child Health
Social Workers
Other Outreach Workers

Only when the entities agree on the health problems to be addressed and support is developed at the local level can a program of intervention be successful. This approach requires flexibility on the part of I/T/U programs and willingness of the dental team to respond to the priorities set by the community.

Needs Assessment

First Steps

The identification and description of a community's health problems requires a needs assessment. The first step is to accurately determine the problem to be addressed, the segment of the population who has the problem, and the extent of the problem. Needs assessments can be done on different levels, using a variety of techniques, including:

dental records review, health risk appraisals, focus groups, key informant interviews, and community surveys of oral health status and perceived health needs.

Assisting the community to examine and quantify its own oral health status is an essential first step for appropriate planning, targeting, monitoring, and evaluation of the COPC program. Once the health problems of the community have been identified and prioritized, a health care program can be tailored for that community and specific program objectives can be developed. The Association of State and Territorial Dental Directors (ASTDD) has developed a comprehensive manual entitled, *Assessing Oral Health Needs: ASTDD Seven-Step Model*. It is available from the National Center for Education in Maternal and Child Health, 2000 15th Street North, Suite 701, Arlington, Virginia 22201-2617.

ASTDD Seven-
Step Model

3. Develop a Health Care Program

The development of a health care program is best done using a systematic approach. The IHS promotes and uses the POARE format for planning health care programs. POARE is an acronym to assist those planning health care programs. The acronym stands for:

POARE
Format

- P – problem
- O – objective
- A – activities
- R – resources
- E – evaluation

Using the POARE format forces health care providers and the community to fully explore the program, especially in terms of costs and effectiveness.

As discussed earlier, the **problem** is identified using the health care provider's knowledge, clinical data, epidemiological surveys, and the perceptions of the community. The epidemiological survey, clinical data, and/or community perceptions can then be used as the baseline measure when setting the objectives.

Objectives should be measurable over time, such as, "In the next five years 70% of the 6 to 8 year-old children will be caries-free." The objectives should be easily understood by the health care providers and the community.

The **activities** should be chosen to impact on the objective. For example, if the above objective were adopted it would be better to plan interventions for children and families with children ages 1 to 8, since these will be the children in the 6 to 8 year-old age range after the five year period is up. If activities are planned for 6 to 8 year-olds only, the

opportunity to prevent decay in the children that will be 6 to 8 years old at the end of five years is lost.

Resource identification and evaluation are components of COPC plans that are often ignored or given too little consideration, but they are both important components of successful programs. It is essential that the cost of COPC programs be estimated as accurately as possible over the time specified in the objective, so that the program can be maintained throughout its duration. The resources needed include staff time, supplies, community volunteers' time, and funds available. *It is important for the health care providers and the community to have a full understanding of the commitment in time and money that is being made in order to meet the objective.*

The **evaluation** component should be delineated during the planning of the program and should include assessment of the specific activities involved in the program, as well as assessment of the desired health outcome (the health outcome is usually the objective that was identified earlier in the POARE process).

Additional
Resource

Note: A POARE worksheet to help plan programs is available from Area Prevention Officers or the IHS Oral Health Promotion/Disease Prevention Consultant at Headquarters West in Albuquerque (505) 248-4175.

Activity Evaluation

Activity/Outcome
Relationship

The activities that have been identified and completed in the activities component of the POARE format should be evaluated separately from the evaluation of the objective that was identified in the POARE format. Only then can it be determined if the health outcome was achieved because the activity was successful. For example, you may have a very successful sealant program that was done well in every way, but the 6 to 8 year-old children targeted in the objective still have a high rate of decay because smooth-surface caries made up the majority of lesions. Or pit and fissure lesions may be the most prevalent, but your sealant program was not effective because the response was poor (e.g., only half of the children returned their permission slips for sealants), the timing was bad (e.g., the children in the second grade that were targeted already had decay), or the technique was poor (e.g., half of the sealants fell off shortly after placement). Only after ensuring that the activities have met pre-specified quality parameters can the determination be made that the activities had a positive impact on the objective. The documentation and assessment of specific activities should also include careful recording of the time and resources invested in all phases of performing the activity, such as planning, materials, travel, set up, and implementation.

Health Outcome Evaluation

Measurement of the health objective should be consistent with the method used to determine the baseline. For example, if calibrated examiners used tongue blades and fiberoptic lights in the classroom setting to determine how many 6 to 8 year-olds were caries-free five years ago, the same calibration standards, equipment, and location should be used to measure whether the objective was met five years later. The evaluation method should be easily understood and accepted by health care providers and the community.

Measurement
Standards

Measuring the impact of a specific activity on a health outcome can be quite complex and may involve techniques beyond the scope of the program. Most health outcomes are influenced by multiple factors, many of which are out of the Dental Program's control. In addition, when several activities are targeted toward the same outcome, it is difficult to determine which activity or activities were effective. Most programs will need to settle for an **assumption** that the activities implemented had an impact on the health outcome listed in their objective. The extent of the impact often must be assessed through comparisons to the literature and other programs which are similar and do not implement the same activities. The most simple strategy is to implement one activity at a time for a specific health objective. When the impact of that activity is clear, another activity can be implemented. Determining the impact of one activity is much easier than determining which of ten activities (if any) is making the difference.

Activity
Impact

4. Monitor the Efficiency and Effectiveness of Health Care Program Modifications

Monitoring the efficiency and effectiveness of the health care program is done through the resource and evaluation components of the POARE format. The community and health care professionals should be informed of the results of the evaluation phase of the program and the amount of resources expended. During discussions about these two components decisions can be made about changes in the program that will increase efficiency and effectiveness and continue to improve health status of the community.

If the quality of a program cannot be assured, the program should be discontinued. Also, programs that are cost- and time-intensive that demonstrate little effect on health outcome should be dropped, redesigned, or scaled back. For example, health fairs build good public relations in the community; however, it may be difficult to evaluate changes in health behavior or health status based on attending a health fair. Programs that demonstrate a strong positive effect should be retained, as long as resources are available to implement them. Discussions with the community about these issues should be undertaken before the project is implemented, so that there is a clear understanding as to why some activities may need to be dropped or enhanced later in the program.

In addition to these four functional steps in the management process of COPC, it should be noted that disease-preventive approaches are emphasized rather than curative and rehabilitative approaches. As the COPC program matures, it becomes possible to identify high-risk individuals and populations, such as those at risk of developing Early Childhood Caries, and to target health promotional and rehabilitative resources toward these groups. Also, special population groups, such as the handicapped and elderly, can be incorporated into the primary health care scheme.

Cultural Integration

The COPC program should be *culturally integrated*, promoted widely enough so that most people know that it exists, be readily accessible, and be continued over a long period of time. A wide variety of manpower, which will range from community volunteers to health professionals within the clinical environment, must be utilized to carry out an effective COPC program.

Community Development Goal

According to the United Nations, the goal of community development is for the community to participate in a self-initiated process to create conditions of economic and social progress for the community. Mahler, of the World Health Organization, states:

Health is not a commodity that is given; it must be generated from within. Similarly, health action cannot and should not be an effort imposed from outside and foreign to the people; rather *it must be a response of the community to the problems that the people in the community perceive*, carried out in a way that is acceptable to them and properly supported by an adequate infrastructure. (2)

How then can we as outsiders work to bring about change in the community without imposing on people in the community? How do we foster a response from within the community? Are we, as providers interacting with our patients and community groups, also members of the community? An understanding of the community and its people is just as important for successful public health work as knowledge of disease and treatment. We must learn to gain the trust of and to listen respectfully to people of that community. Before new health habits can evolve, it is important for the community to become aware of existing habits, how they are linked to one another, what functions they perform, and what they mean to those who practice them. (3) The community must then form a shared vision of better health. Only then can new health habits emerge.

The COPC model has a much greater potential for improving the overall health of a defined community than does the traditional rehabilitative structure. With the majority of modern health problems being related to lifestyle, it is imperative that we involve communities in increasing our knowledge base and supporting the American Indian/Alaska Native people in improving health-oriented behavior.

Implementation of a Community Oral Health Plan

Community-Oriented Primary Care (COPC) can be defined as a model of primary health care in which systematic mechanisms describe the health status and needs of a defined population (a community). The population served is involved in health needs assessment and health policy decisions. Planning based upon epidemiological methods is fundamental, as is universal coverage of services of the population. The COPC program development process outlines appropriate stages in the development and implementation of an effective community-based dental program.

So, how does one go about implementing a COPC program? How does one know if the community is ready to participate in the program? A few examples may help to clarify these issues.

In 1987, a dentist convened a meeting of community members to discuss the oral health of the people in the community. The dentist reported the disease rates of the school children that had been screened in the community and discussed the dental decay process and prevention strategies available at the time. These prevention strategies included the use of fluoride (topical and systemic), sealants, toothbrushing with fluoridated toothpaste, and controlling sugar intake in the diet. The people in the community wanted a dentist in their community full-time to perform restorative treatment, instead of the part-time service they now received.

In the past, the dentist had dismissed this request by the community as impossible and had tried to sell the idea of preventing decay instead. However, during this meeting the dentist decided to try a new approach. The dentist listened to the ideas of the community members and acted as a facilitator to the group discussion; drawing out their perceptions of the problem, how to solve the problem, what it would cost, and where the community would find the resources to support the program.

The dentist allowed the meeting to set its own pace and did not offer solutions/advice unless the community members requested it. At the conclusion of the meeting, the community decided that they could not afford to hire a full-time dental team and to purchase equipment for a clinic.

This is the same conclusion that the dentist had forced upon them for the past three years, but since the community owned the discussion and decision they were willing to live with it and look to other solutions in the future.

Another example of a COPC program was begun in 1995 in one of the small Alaskan villages near Kodiak Island, Alaska. A survey of tobacco use among schoolchildren in the village was conducted by a dental health professional. Once the results were

compiled, the information was presented to the village health council for their information. The health care professional facilitated a planning session with the council to decide what, if any, action to take to reduce tobacco use by the schoolchildren. The village council decided what they wanted to do and the professional provided training and technical assistance to village leaders, teachers, parents and children. The community decided the action plan, not the health care professional. The professional could have made a unilateral decision that there was a problem, implemented a cessation and/or education program, and then evaluated its success. However, community ownership of the problem as well as the interventions will most likely result in a greater community “buy-in” and a “solution” that the community believes will reduce tobacco use by the children in the village.

A last example is a community-oriented program to prevent Baby Bottle Tooth Decay (BBTD) which was begun in 1985. Once the problem of BBTD was documented through oral health screenings of Head Start children in several sites across IHS, the results were discussed with the local Tribal health boards to gain their involvement. Local community members were trained and interventions developed by the community members. Educational materials were also developed by local dental staff, WIC staff, CHRs, and community volunteers. Ten years later, in those sites where community-based educational efforts are still on-going, the prevalence of BBTD continues to decline.

If you need help starting a COPC project, contact your Area or HQ dental staff or others who have implemented a program.

Additional Resource

Restoring Balance: Community-Directed Health Promotion for American Indians and Alaska Natives. Copies may be obtained by contacting the Stanford Center for Research in Disease Prevention, 1000 Welch Road, Palo Alto, CA 94305-1885 (415) 723-0003.

Community Oral Health Education

Community education in oral health is often connected with puppet shows in shopping malls or smile contests during National Children's Dental Health Month, public service announcements, or newspaper articles on oral health. While these activities are components of community oral health education, the purpose of community education is to impact the high rates of dental disease. These activities may support the overall goal to improve the oral health of a population but are not always the most direct or effective choices for achieving this goal. The cornerstone of the IHS Dental Prevention Program is community water fluoridation and sealants. Community education designed to accomplish fluoridation of the public water supply or make sealants more accessible, which produces the greatest improvement in oral health status for the greatest number of people, would be an effective and practical community effort to reduce caries rates.

Frazier defines health education in dental public health programs as:

A process of organizing and involving groups of decision-makers and opinion leaders in active decision-making with regard to the selection and implementation of organized community dental programs which: a) are designed to prevent or control oral diseases; b) have been shown to be effective and practical at the community level; and c) operate independently of individual performance or habit (1).

Frazier states that community education efforts should be focused on adult decision-makers and opinion leaders in the community, versus individual motivational efforts, since these broader methods are more cost-effective (2).

Others have suggested that the number of people who are susceptible to prevention messages is a small fraction of those who need them and that oral health depends on a style of living which is not easily influenced by the dentist. People may not be susceptible to the prevention message because of physical and psychological conditions which do not provide a receptive and supportive environment. Community education prepares or enhances the conditions to provide a more receptive and supportive environment.

The underlying principle in applying the skills and methods of health promotion and health education at any public level is the attempt to modify or change behavior. Appropriately-directed behavior will then result in the prevention or reduction of disease and an elevation of health status of an individual or community.

Integral components of these prevention efforts are patient and community education. It is not enough to tell people what to do; we need to work toward establishing positive health values. Health professionals should always be assessing whether a

patient's/community's noncompliance is due to a lack of technical skills or knowledge, failure to recognize the importance of self-care, or a lack of motivation. Education must permeate every aspect of the prevention program and focus on changing specific health behaviors.

Health behavior can be divided crudely into two general types: compliance behavior and innovations. Compliance behaviors are behaviors which are generally known and recognized by both the learner and the community to be important to health. Indeed, one of our biggest challenges in reducing the burden of chronic disease is to improve compliance by our clients with prescribed behaviors. In contrast, innovations are novel behaviors, ideas, or attitudes. What we, as health professionals, may perceive as a compliance behavior issue, may be viewed by the client (or community) as something novel — an innovation. Our concern is how to decrease the length of time it takes for adoption of the innovation and to increase the number of people who adopt it. *The stages of adoption which the client and the community must pass through are: awareness, interest, trial, decision, and adoption* (3). These stages are part of a process and not an end point. Different parts of the community will be at different stages of adoption. People or communities must go from one stage to the next. The challenge is to target the education to the stage that the person or community is at, i.e., match the stage and educational effort.

In acting as change agents, we are more likely to be credible if our programs:

1. Fit the clients' cultural beliefs and values.
2. Involve clients in planning the change.
3. Increase the client's ability to evaluate innovations.
4. Use opinion leaders to spread the program (4).

Four methods for approaching change are: persuasive communication, empirical-rational education, normative re-education, and community organization (5). These all overlap to some extent and are often used in combination to tailor an approach toward a specific community problem. Persuasive communication is trying to convince and motivate people to take a specific action, often using mass media. Empirical-rational education is to convey a body to knowledge and skills that people rationally want to do because it serves their self-interest. This is the standard "classroom" approach to education used in schools. Knowledge, however, does not necessarily lead to behavior change.

Normative re-education is to involve the learner as an active participant who must unlearn old behaviors in order to learn new ones. It recognizes that learning is influenced by social norms and values and by institutional biases. The way the client sees himself and his problem must be brought into a dialogue with the way in which he and his problem are seen by the change agent. The problem may not be one of knowledge, but of attitudes, values, norms, or social relationships. *The client should be collaboratively*

involved in defining and solving the problem. Acceptance or modification is not a random process but depends on how the new item or idea is perceived by the potential recipients, how it accords with their values and assumptions, and whether it is consistent with their system of social relationships. It also depends on the social status of the innovator and the implications of that status for the various segments of the community (6). An outcome of this approach is that social norms are redefined.

It is clear that public funds should not be expended in activities that have not been demonstrated to be effective. Certainly the most cost-effective methods for preventing disease should be used first. Activities directed only toward the dissemination of information, but that do not focus efforts on changing behavior, fall short of inclusion as health education activities.

All community efforts should be evaluated on adequacy, efficiency, effectiveness, appropriateness, and side effects. Evaluation of community education efforts can be accomplished through surveys on knowledge, skills, and attitudes. Baseline information can be gathered before and after intervention strategies are implemented.

Oral health education and health promotion are components of each prevention strategy recommended in this manual. Although the effects of oral health education are subtle and have not always proven to be effective in reducing disease rates, educational presentations are often useful for raising the public's interest or getting people to support/adopt a program. These presentations might include the following:

1. Health fairs
2. Oral health in the clinics or community
3. Media messages through radio, TV, newspapers, and posters
4. Presentations to specific targeted groups
5. Tribal presentations
6. Speeches at special events
7. Parades

Providing a consistent oral health message over time may increase behavior compliance when integrated with other community-based strategies.

Here are some tips for making more effective group presentations:

1. Use attention getters/visual aids.
2. Tell stories or use examples to teach the facts. (Present good local data when available.)
3. Use appropriate and effective audiovisual aids.

Effective Group Presentations

4. Call for action. Let your audience know what they can do to prevent dental disease. What do you want them to do differently tomorrow as a result of your presentation?
5. Above all, don't forget to KISS — Keep It Short and Simple! No one likes a boring technical discussion. Education is the most effective when it is given in small steps and in language the audience can understand.

References

1. Malvitz DM. Education for oral health. Chapter 15 in Striffler, Young, & Burt, Dentistry, dental practice, & the community, p. 469.
2. Frazier, P Jean. The effectiveness and practicality of current dental health education programs from a public health perspective; a conceptual appraisal. Presented as a part of symposium, Methods for the Prevention of Dental Disease: Effectiveness and Practicality, an annual meeting of the Dental Health Section, American Public Health Association, Miami Beach, Florida, Oct. 20, 1976. 28p duplicated.
3. Rogers EM. Diffusion of Innovations, 3rd Ed. New York: The Free Press, 1983.
4. Bennis WG, Benne KD, Chin R. The Planning of Change, 4th Ed. New York, New York: CBS College Publishing, 1985.
5. Greene, WH, Simons-Morton, BG. Introduction to Health Education. New York, New York: Macmillan Publishing Company, 1984.
6. Paul, BD. Health culture and community: case studies of public health reactions to health problems. New York, Russell Sage Foundation, 1955.

Additional Reading

IHS Oral Health Education Resource Catalog, 1993.

Caries Diagnosis, Risk Assessment, and Management

Introduction

For many years the scientific literature has suggested that a risk-based assessment of an individual patient's dental caries history and oral health status is an important prerequisite for appropriate preventive and/or treatment actions (1-7). In the Indian Health Service (IHS), this risk-based approach is also supported by program managers and clinicians. The following guidelines on caries diagnosis, risk assessment, and management strategies were developed by a work group of senior clinicians, general practice and pediatric specialists, epidemiologists, and public health consultants. A risk classification table with preventive regimens and product resource list are also provided.

This model provides a framework for decision-making to determine a patient's risk of dental decay and appropriate preventive and treatment strategies. It considers the clinician's judgment as well as available resources. In a public health program, clinicians should also assess resources and activities such as community water fluoridation and school-based programs, including sealant screening and placement, and fluoride mouthrinse programs. The overall objective is to work with patients and communities to improve the oral health of American Indian/Alaska Native people in the most effective and efficient manner possible.

Risk Assessment
Objectives

The underlying principle of this document is to approach dental caries as an infectious disease (8-12). Most resources in our dental clinics are invested in the diagnosis, treatment, and prevention of this infection. These resources are maximized by appropriately addressing the diagnosis, prevention, and treatment of dental caries. Studies have shown that flexible recall systems and targeted care are cost-effective and time-effective, providing the greatest health benefits to defined populations (4, 13-15). Each patient's individual risk for caries impacts on that patient's treatment plan. Since most restorative treatments result in irreversible changes in those teeth involved, establishing a treatment plan involves weighing the risk of dental disease progression against the risk of receiving dental intervention. The guidelines in this subsection can assist you in exercising your clinical judgment by organizing caries diagnosis, risk assessment, prevention, and treatment strategies.

Caries as an
Infectious Disease

Diagnosis

Dental caries must first be correctly diagnosed before appropriate interventions can be considered. Dental diagnosis is best accomplished longitudinally, comparing available

examination and radiographic data over time. Single “snapshots” often do not supply information about disease progression/regression, especially when lesions are in the early stages of development. Exams are best completed in a dry field with bright illumination. The explorer is not the instrument of choice for diagnosing caries. A sharp explorer has been shown to cause cavitation of otherwise reversible active lesions, gives false information when diagnosing by “stick” and does not improve the validity of diagnosis (16-18). Limited use of a dull explorer with light pressure for other conditions is optional. Radiographs are prescribed to confirm, not establish, the diagnosis of caries. Stained grooves and rough restoration margins are not of themselves indications of active caries nor of caries potential (17-22). Only carious lesions which are active, frank, and cavitated require the irreversible surgical intervention of operative dentistry. Carious lesions that are not active, frank, and cavitated, such as “white spot lesions” and/or incipient lesions, are best addressed using a medical approach (12,21). This medical management of caries is similar to current medical management of other infectious diseases (21). The clinician may rely on visual and microbiological diagnosis such as “Cariescreen” and pharmacotherapeutic interventions such as professionally-applied (foam, varnish, and gels) and home-use topical fluoride products (toothpaste, rinses) as well as chlorhexidine to control the infection.

Caries Risk Assessment

There is evidence in the scientific literature that dental caries history or experience (usually expressed as DMFT/DMFS, deft/defs scores) is not evenly distributed in the general population (23-26). In the IHS, it has also been documented that dental caries experience is not evenly distributed (27-29). In contrast to the U.S. population, most of our subpopulations have a small proportion of people who have either low or high dental caries experience and a relatively large proportion who have moderate dental caries experience. One goal of the Dental Program is to increase the proportion of low-risk patients and decrease the proportion of high-risk patients in a given community. Targeting resources for high-risk patients and “moving” patients from high-risk to moderate-risk and from moderate-risk to low-risk categories can maximize the impact of limited program dollars. The more patients in the low-risk category, the more opportunity to increase access to those in the moderate- and high-risk categories and increase their opportunity for achieving better oral health. Since there is generally less disease if patients have better access to routine and preventive services, an effective public health approach to Oral Health Promotion/Disease Prevention (OHP/DP) includes improving access as a preventive strategy.

Targeting of High-Risk Patients

Sound clinical judgment is necessary to establish dental caries risk and prescribe appropriate interventions. Gathering information from and about patients is critical in determining this risk. In this model, the key decision which drives caries risk assessment

is the presence of active cavitated lesions at the time of the examination. Many studies indicate that previous caries experience is one of the best predictors of future caries experience (1,2,4-7,30-34).

Other factors that may predispose an individual to dental decay include the following:

Tooth morphology, age, fluoride exposure (both too much and not enough), oral hygiene, frequency of dental visits, medical conditions and medications being taken, root exposure, salivary flow, *mutans streptococci* levels, family's dental experience, orthodontics, removable appliances, and diet.

The type and nature of modifiers applicable to an individual may indicate that he/she should be moved into a different risk category. No attempt was made to regulate the number of modifiers which would move a person into a different risk category; this decision has been left up to the clinician's judgment. However, patients should be reassessed and reclassified at subsequent recall visits for the appropriate risk category. A patient initially classified as "high-risk" or "moderate-risk" may fall into a "low-risk" category at recall if no new lesions are found and modifying factors such as fluoride exposure and oral hygiene have changed. "Low-risk" patients may also move into other categories if oral conditions change. Risk categories and classification are fluid.

Modifiers

The following risk categories are defined and provide guidelines for preventive regimens as well as recall intervals for assessing caries risk status:

Risk Categories

Low-Risk Patients

A patient is considered to be at low risk if he/she has **no active cavitated lesions** at the examination appointment and few risk modifiers are present. For the patient at low risk, the preventive regimen includes reinforcing his/her use of fluoridated toothpaste, a review of oral hygiene procedures, and discussion of the patient's diet. If there are incipient lesions or deep pits and fissures and/or the patient has a previous history of caries, apply sealants on all appropriate teeth. The application of sealants has been proven to be one of the best caries preventive regimens available (35-38).

Preventive
Regimen

Low-risk patients can be advised to return to the dental clinic in 24-36 months. This time should be shortened if a patient is in a mixed dentition stage or other modifiers are present.

Moderate-Risk Patients

Patients with **one active cavitated smooth-surface lesion** at the time of the exam are considered to be at moderate risk. Again modifiers could place a patient in a higher or lower risk category.

Preventive Regimen

Moderate-risk patients should receive appropriate education including diet, use of fluoride, and oral hygiene at the exam appointment. Sealants should be applied to all appropriate teeth before any restorative services are provided.

Based on local resources, over-the-counter daily fluoride mouthrinses or a semi-annual professionally-applied topical fluoride treatment (foam, gel, or varnish) may be recommended or provided as appropriate (39-42).

Note: Annual or less frequent applications of professionally-applied topical fluoride treatments have not been shown to be effective.

A six-month to 24-month recall should be implemented for these moderate-risk patients, depending on the number of modifiers present. For example, a patient with only one smooth-surface lesion, but deep pits and fissures, mixed dentition, poor oral hygiene, and lack of any fluoride exposure, should be recalled at shorter intervals.

High-Risk Patients

Patients with **two to five active cavitated smooth surface lesions** on permanent teeth at the time of the exam are considered to be at high risk in this protocol. Patients who were former “very high-risk patients” could also be placed in this group. Again modifiers could place a patient in a different risk category, either lower or higher.

Preventive Regimen

These high-risk patients should receive appropriate treatment which includes pit and fissure sealants and the restoration of carious lesions. Additional preventive treatment measures at the exam and subsequent appointments could include: professionally-applied topical fluoride treatments (foam, gel, and varnish), antimicrobial rinses, and patient education (diet, use of fluoride toothpaste, and oral hygiene).

A six-month to 12-month recall should be implemented for high-risk patients, depending on the number of modifiers present. For example, a patient with two smooth-surface lesions, deep pits and fissures, good oral hygiene, and regular fluoride exposure should be recalled at the longer interval.

Very High-Risk Patients

Patients with **six or more active cavitated smooth surface lesions** on permanent teeth at the time of the exam are considered to be at very high risk. Immediate action should be

taken on these very high-risk patients to reduce or eliminate their dental infection before providing definitive restorative care in the permanent dentition. At the examination appointment oral hygiene instructions should be given and patients should be instructed to brush their teeth at least twice a day with an antimicrobial product such as a chlorhexidine mouthrinse. Cavitated lesions should be eliminated as soon as possible: two or fewer appointments are recommended; definitive restorations need not be placed at this time. Sealants should be placed on all pits and fissures as appropriate and fluoride varnish placed on decalcified areas of the teeth. An antimicrobial rinse should also be prescribed or dispensed to these patients after the cavitated lesions have been treated (43-48).

Once actions have been taken to eliminate the dental infection, additional dental treatment and preventive measures can be undertaken for these patients, including the following: obtaining *mutans streptococci* counts, completing restoration of existing lesions, applying topical fluorides (foam, gels, and/or varnish) and using additional antimicrobials. Dietary counseling utilizing the services of a nutritionist, if possible, and educational reinforcement including the use of xylitol gum may also be indicated for these very high-risk patients. Xylitol is noncariogenic and quite possibly anticariogenic in humans when substituted for sucrose in foods or in chewing gums. In one chewing gum study, children who chewed three pieces of xylitol gum per day had a 30 to 80 percent reduction in the incidence of caries when compared with control children who received no gum (49).

Preventive
Regimen

When the presenting carious infection is controlled, as indicated by *mutans streptococci* counts or lack of new lesion development and stasis of current lesion progression, the patient may be moved into the high-risk protocol and definitive restorative care provided to the extent clinic resources allow.

Strep Mutans
Levels

Infants and Young Children

Traditionally, children have not been seen in the dental clinic regularly until about age three. However, it is now realized that the microorganisms that develop in the child's mouth certainly become active at a much earlier age. The oral flora are often similar to that of the primary caregiver, i.e., if a mother has a high *mutans streptococci* level her child will also have an elevated level, with subsequent high caries experience (50-52).

Caries progression in primary teeth is more rapid than in permanent teeth. The enamel thickness is reduced in primary teeth, and the organic or mineralized component of the tooth is lowered. Primary teeth are more likely to have hypoplastic defects. Primary tooth pulp space is proportionately enlarged leading to earlier pulpal involvement.

The goals of caries prevention in the young child involve controlling the initial infection as well as managing carious lesions. Keeping caries activity at a low enough level to

avoid potential treatment with or without restraint, sedation, or general anesthesia reduces medical risk and costs. Treatment regimens designed to arrest lesions or delay progression and allow children to mature until cooperative behavior and traditional restorations are possible are a great benefit. If resources permit, it may help to give primary caregivers accelerated access into a caries control program.

Fluoride Varnish

In many instances the practitioner should be able to arrest the progression of early lesions. Fluoride varnish may be applied quarterly to incipient or white spot lesions, or areas with developmental defects that are at risk. Often, cavitated lesions can be treated with the Atraumatic Restorative Treatment (ART) technique and/or the Banded

ART

Atraumatic Restorative Treatment (BART) technique. ART technique involves gross caries removal with hand instrumentation, usually without local anesthesia, and the placement of a glass-ionomer restoration. On larger lesions, especially interproximal lesions on the primary incisors, an appropriately sized orthodontic band may be cemented with a glass-ionomer cement. This is the BART or Banded Atraumatic Restorative

BART

Treatment technique. Glass ionomers release fluoride to inhibit lesion progression and bond to teeth to inhibit microleakage. These restorations may be replaced as children age and are able to accept clinical restorative treatment.

Caries Management

Managing active carious lesions involves three steps:

1. Arresting the infectious disease process and preventing further spread by utilizing a medical model
2. Completing the restorative process (a surgical approach)
3. Evaluating the outcome of the medical and surgical interventions

Operative dentistry is a destructive process. It is justified only by the greater risk of destruction caused by an irreversible, frank, active carious lesion. More concern should arise from a false positive diagnosis of dental caries leading to unnecessary surgical tooth destruction than from a false negative caries diagnosis (53). Carious lesions in permanent teeth usually progress slowly, and may be arrested or reversed. Therefore, conservative treatment options such as sealants, preventive resin restorations, avoiding “extension for prevention,” and appropriate recall based on risk are preferred. The goals of this conservative approach are twofold: first, to avoid unnecessarily placing the first restoration, which likely commits the patient and the dental program to a series of future replacement restorations of increasing size at the expense of natural tooth structure; and second, to minimize the future size and frequency of those replacements. Remember, the decision to do one thing is often a decision to not do something else, even if this decision is not consciously made. In our programs, decisions to provide extensive treatment

frequently translate to the provision of services to one patient at the expense of access to care for another.

Individual treatment plans will be impacted by the patient's oral and systemic conditions, Dental Program resources and priorities, and the dental staff's capabilities and interests. The ability of a dental program to provide access is influenced by the choices each dentist makes about when to treat each individual patient and when to have each patient return to the clinic for follow-up and recall care. Of course, the patient's responsibility and commitment to oral health are critical to any intervention.

Preventive Regimen

A shotgun approach to prevention, e.g., every patient receives a fluoride treatment at the exam appointment, is not an effective or efficient approach to managing a caries control program. Preventive regimens should be targeted based on health status and risk category.

Targeted Approach

If there is a high demand for services and few resources, preventive strategies should be focused upon those activities proven to be effective, i.e., fluorides and sealants (35-39). Proven regimens which are also cost-effective for most of our populations are identified with an asterisk in the risk classification table. Some procedures, such as reinforcing self-care and dietary counseling, should be provided even though these measures may be less effective than other preventive regimens. Time invested in these procedures should be limited accordingly.

Emphasis on
Fluorides and
Sealants

The use of the preventive services assessment on the dental examination form is meant to serve both as a mechanical reminder to the dentist to address the preventive aspects of oral health care and as documentation that preventive measures were discussed with the patient and/or caretaker.

If the need for preventive services is indicated in the assessment on the dental examination form, those services should also be specifically described as part of the overall treatment plan. A patient's risk status can be indicated on the line for target group, e.g., "high-risk caries."

Summary

This subsection is not a cookbook. Your clinical judgment is required. The information presented here is to serve your caries diagnosis, risk assessment, and treatment planning process regarding your patient's actual risk, relative to the infectious disease of dental caries. With limited resources and high dental disease rates, it is critically important that clinicians manage the infectious disease process rather than focus only on treatment regimens. Assessing the patient's risk, applying appropriate preventive regimens, and

evaluating compliance with these regimens before providing invasive restorative procedures are key. It is hoped that these guidelines will enable programs to avoid wasting limited resources and increase access to the health delivery system.

RISK CLASSIFICATION by Age & Preventive Regimens

Modifiers: Past caries experience, white spot lesions, tooth morphology, age, fluoride exposure, oral hygiene, frequency of dental visits, age, medical conditions, medications, root exposure, salivary flow, *mutans streptococci* levels, family's dental experience, orthodontics, removable appliances, and diet.

AGE	RISK CATEGORY	PREVENTIVE REGIMEN
1-4 years	LOW: No active lesions of any type at exam	Education/Reinforcement Sealants/behavior permitting ** Fluoride supplements PRN * 6-12 month recall
	HIGH: Any cavitated or white spot lesions at exam. Continued bottle feeding after 12 months, family caries history	Education/Reinforcement Sealants/behavior permitting ** Fluoride supplements PRN * Emphasize use of fluoride toothpaste (supervised) ** Topical fluorides (foam, gels, varnish) ** Appropriate restorative tx 3-6 month recall
5+ years	LOW: No active cavitated lesions at exam	Education/Reinforcement Sealants ** Fluoride supplements PRN * 24-36 month recall (A more frequent recall may be indicated during the mixed dentition.)
	MOD: 1 active cavitated smooth-surface lesion at exam	Education/Reinforcement Sealants ** Fluoride supplements PRN * Emphasize use of fluoride toothpaste ** Home fluoride rinses and professionally-applied semi-annual topicals * Appropriate restorative tx 6-24 month recall
	HIGH: 2-5 active cavitated smooth-surface lesions at exam, or 2 new lesions with a history of smooth-surface lesions in permanent teeth.	Education/Reinforcement Sealants & PRR's ** Topical fluoride treatments * Fluoride supplements PRN * Chlorhexidine * Emphasize use of fluoride toothpaste ** Dietary counseling (refer to nutritionist if practical) Xylitol gum Restorative tx 6-12 month recall
	VERY HIGH: 6+ active cavitated smooth-surface lesions at exam	Education/ Reinforcement Toothbrushing with chlorhexidine 2x day Dietary counseling (refer to nutritionist if practical) Eliminate cavitated lesions ASAP (2 or fewer appts.) Sealants ** Fluoride supplements PRN * Topical fluorides ** Chlorhexidine * Assess compliance and/or <i>mutans streptococci</i> levels Restorative tx Antimicrobials (if needed) * Fluoride varnish (if needed) ** Xylitol gum Move to high-risk category 6-12 month recall

** proven with large clinical trials; * proven with smaller clinical trials

References

1. Dummer PM, Oliver SJ, Hicks R, Kingdon A, Kingdon R, Addy M, Shaw WC. Factors influencing the caries experience of a group of children at the ages of 11-12 and 15-16 Years: Results from an ongoing epidemiological study. *J Dent*. 1990;18(1):37-48.
2. Newbrun D, Leverett D. Risk assessment of dental caries working group summary statement. In Bader JD, ed. *Risk assessment in dentistry*. Chapel Hill: University of North Carolina Dental Ecology, 1990.
3. Koch G. Importance of early determination of caries risk. *Int Dent J*. 1988;38:203-10.
4. DeLiefde B. Identification and preventive care of high caries-risk children: a longitudinal study. *New Zealand Dent J*. 1989;85:112-116.
5. Leverett DH, Featherstone JD, Proskin HM, Adair SM, Eisenberg AD, Mundorff-Shrestha SA, Shields CP, Shaffer CL, Billings RJ. Caries risk assessment by a cross-sectional discrimination model. *J Dent Res*. 1993;72(2):529-37.
6. Beck JD, Weintraub JA, Disney JA, Graves RC, Stamm JW, Kaste LM, Bohannon HM. The University of North Carolina Caries Risk Assessment Study: comparisons of high risk prediction, any risk prediction, and any risk etiologic models. *Community Dent Oral Epid*. 1992;20(6):313-21.
7. Disney JA, Graves RC, Stamm JW, Bohannon HM, Abernathy JR, Zack DD. The University of North Carolina Caries Risk Assessment Study: further developments in caries risk prediction. *Community Dent Oral Epidemiol*. 1992;20(2):64-75.
8. Keys PH. The infectious and transmissible nature of experimental dental caries. Findings and implications. *Arch Oral Biol*. 1960;1:304-320.
9. Milnes AR, Bowden GHW. The microflora associated with the developing lesions of nursing caries. *Caries Res*. 1985;19:289-97.
10. Kohler B, Bratthall D, Krasse B. Preventive measures in mothers influence the establishment of the bacterium *Streptococcus mutans* in their infants. *Arch Oral Biol*. 1983;28:225-31.

11. Rogers AH. The source of infection in the intra-familial transfer of *Streptococcus mutans*. *Caries Res.* 1981;15:26-31.
12. Treating caries as an infectious disease. *J Am Dent Assoc. Special Supplement* 1996;126:2S-3S.
13. Wang N, Marstrander P, Holst D, Ovrum L, Dahle T. Extending recall intervals — effect on resource consumption and dental health. *Comm Dent and Oral Epid.* 1992;20:122-4.
14. Wang NJ, Holst D. Individualizing recall intervals in child dental care. *Comm Dent and Oral Epid.* 1995;23:1-7.
15. Wang NJ, Riordan PJ. Recall intervals, dental hygienists and quality in child dental care. *Comm Dent and Oral Epid.* 1995;23:8-14.
16. Ekstrand K, Qvist A, Thylstrup A. Light microscope study of the effect of probing in occlusal surfaces. *Caries Res.* 1987;21:368-374.
17. Lussi A. Validity of diagnostic and treatment decisions of fissure caries. *Caries Res.* 1991;25:296-303.
18. Pitts NB. Current methods and criteria for caries diagnosis in Europe. *J Dent Educ.* 1993;57(6):409-414.
19. Brantley CF, Bader JD, Shugars DA, Nesbit SP. Does the cycle of reresoration lead to larger restorations? *J Amer Dent Assoc.* 1995;126:1407-1413.
20. Anderson MH. Repairing the ditched amalgam. *IDA-Journal* 1993:19-21.
21. Anderson MH, Bales DJ, Omnell K. Modern management of dental caries: the cutting edge is not the dental bur. *J Amer Dent Assoc.* 1993;124:37-44.
22. Kidd EA, Joyston-Bechal S, Beighton D. Marginal ditching and staining as a predictor of secondary caries around amalgam restorations: a clinical and microbiological study. *J Dent Res.* 1995;74(5):1206-11.
23. Brunelle JA. Dental caries in US children 1986-1987. NIH Publication No. 89-2247, Bethesda, MD: Sept 1989.
24. Hicks MJ, Flaitz CM. Epidemiology of dental caries in the pediatric and adolescent population: a review of past and current trends. *J Clin Pediatr Dent.* 1993;18(1):43-9.

25. Caplan DJ, Weintraub JA. The oral health burden in the United States: a summary of recent epidemiological studies. *J Dent Educ.* 1993;57(12):853-62.
26. Disney JA, Graves RC, Stamm JW, Bohannon HM, Abernathy JR. The University of North Carolina Caries Risk Assessment Study. II. Baseline caries prevalence. *J Public Health Dent.* 1990;50(3):178-85.
27. Niendorff W, Collins R. Oral health status of Native Americans, selected findings from a survey of dental patients conducted in FY 1983-84 by the Indian Health Service. Paper presented at the annual meeting of the American Public Health Association, Las Vegas, NM. Oct. 1, 1986.
28. Niendorff W. The Oral Health of Native Americans. A Chart Book of Recent Findings, Trends, and Regional Differences. DHHS, USPHS, Indian Health Service. 1994.
29. O'Sullivan DM, Douglass JM, Champany R, Eberling S, Tetrev S, Tinanoff N. Dental caries prevalence and treatment among Navajo preschool children. *J Public Health Dent.* 1994;54(3):139-44.
30. Seppa L, Hausen H, Pollanen L, Helasharju K, Karkkainen S. Past caries recordings made in Public Dental Clinics as predictors of caries experience in early adolescence. *Community Dent Oral Epidemiol.* 1989;17:277-81.
31. Bruszt P. Relationship of caries incidence in deciduous and permanent dentitions. *J Dent Res.* 1959;38:416-9.
32. Hill IN, Blayney JR, Zimmerman SO. Deciduous teeth and future caries experience. *J Am Dent Assoc.* 1967;74:430-4.
33. Greenwell AL, Johnsen D, DiSantis TA, Gerstenmaier J, Limbert N. Longitudinal evaluation of caries patterns from the primary to the mixed dentition. *Pediatric Dent.* 1990;12(5):278-282.
34. Kaste LM, Marianos D, Chang R, Phipps KR. The assessment of nursing caries and its relationship to high caries in the permanent dentition. *J Public Health Dent.* 1992;52(2):54-8.
35. Heller KE, Reed SG, Bruner FW, Eklund SA, Burt BA. Longitudinal evaluation of sealing molars with and without incipient dental caries in a public health program. *J Pub Health Dent.* 1995;55(3):148-53.

36. Rippa LW. Sealants revisited: an update of the effectiveness of pit-and-fissure sealants. *Caries Res.* 1993;27(Suppl 1):77-82.
37. Leverett DH, Handelman SL, Brenner CM, Iker HP. Use of sealants in the prevention and early treatment of carious lesions: cost analysis. *J Amer Dent Assoc.* 1983;106:39-42.
38. Weintraub JA, Burt BA. Prevention of dental caries by the use of pit-and-fissure sealants. *J Public Health Policy* 1987;8:542-60.
39. Ripa LW. An evaluation of the use of professional (operator applied) topical fluoride. *J Dent Res.* 1990;69(spec Issue):786-96.
40. Holm, AK. Effect of a fluoride varnish (Duraphat) in preschool children. *Community Dent Oral Epidemiol.* 1979;7:241-245.
41. Petersson LG. Fluoride mouthrinses and fluoride varnishes. *Caries Res.* 1993;27(Supplement 1)35-42.
42. Mandel ID. Fluoride varnishes — a welcome addition (Editorial). *J Public Health Dent* 1994;54(2):67.
43. Emilson CG. Potential efficacy of chlorhexidine against mutans streptococci and human dental caries. *J Dent Res* 1994;73(3):682-91.
44. Zickert I, Emilson CG, Krasse B. Effect of caries preventive measures in children highly infected with the bacterium *Streptococcus mutans*. *Archs Oral Biol.* 1982;27:861-868.
45. Brown AT, Largent BA, Ferretti GA, Lillich TT. Chemical control of plaque-dependent oral diseases: the use of chlorhexidine. *Compend Contin Educ Dent.* 1986;7(10):719-724.
46. Rask PI, Emilson CG, Krasse B. Effect of preventive measures in 50-60 year-olds with a high risk of dental caries. *Scand J Dent Res.* 1988; 96:500-504.
47. Marsh PD, Keevil CW, McDermid AS, Williamson MI, Ellwood DC. Inhibition by the antimicrobial agent chlorhexidine of acid production and sugar transport in oral streptococcal bacteria. *Arch Oral Biol.* 1983;28(3):233-239.

48. Yanover L, Banting D, Grainger R. Effect of a daily 0.2% chlorhexidine rinse on the oral health of an institutionalized elderly population. *Scien J.* 1988;54(8):595-597.
49. Makinen KK, Soderling E, Isokangas P, Tenovuo J, Tiekso J. Oral biochemical status and depression of *Streptococcus mutans* in children during 24- to 36-month use of xylitol chewing gum. *Caries Res* 1989;23:261-267.
50. Milnes AR, Bowden GHW. The micro flora associated with the developing lesions of nursing caries. *Caries Res.* 1985;19:289-97.
51. Kohler B, Bratthall D, Krasse B. Preventive measures in mothers influence the establishment of the bacterium *Streptococcus mutans* in their infants. *Arch Oral Biol.* 1983;28:225-31.
52. Rogers AH. The source of infection in the intra familial transfer of *Streptococcus mutans*. *Caries Res.* 1981;15:26-31.
53. Bader JD, Brown JP. Dilemmas in caries diagnosis. *J Am Dent Assoc.* 1993;124:48-50.

Use of Fluorides in a Public Health Program

Since 1945, when Grand Rapids, Michigan, first fluoridated its city water supply, fluoridation has been considered the most cost-effective public health measure to reduce dental caries. Other sources of fluoride use have also increased tremendously. School fluoridation is considered an alternative in some communities where fluoridation of the public water supply is not feasible. Dietary fluoride supplements, with or without vitamins, are available by prescriptions as alternative sources of systemic (and topical) fluoride for areas without fluoridated drinking water, as are several agents designed for professional application by dental personnel. Fluoride-containing toothpastes have been marketed in the U.S. since the 1950's and comprise about 95 percent of the toothpaste market. Fluoride mouthrinses are used in school-based programs and several brands of mouthrinses with dilute concentrations of fluorides are sold as non-prescription items. Each of these topics is covered in greater detail in the following pages.

Fluoride Sources

This widespread availability of fluoride has resulted in a decline in the prevalence of dental caries among U.S. schoolchildren in general, as well as American Indian/Alaska Native (AI/AN) schoolchildren specifically.

Caries prevention programs for individual children or groups should be implemented based upon a risk assessment. The American Dental Association has recently published a special supplement on caries diagnosis and risk assessment. (1) The IHS Dental Disease Prevention Program endorses these guidelines and recommends that dental clinics develop preventive plans based on these strategies. It is important to evaluate these preventive regimens based on local resources and develop a method to monitor caries attack patterns and rates of disease.

Risk Assessment

Once the oral health status has been determined, administrators must decide the goal of their programs—how much disease can be reduced with fluoride, given the resources available? One must also consider the various sources of fluoride already available for the patient/community. Water fluoridation and fluoridated toothpaste must be the cornerstone upon which dental disease prevention programs are built.

Use of fluoride mouthrinses and gels for individual patients should be predicated upon the caries activity or risk. Use of these methods in public health programs is a matter of cost-effectiveness, which must be weighed against the caries prevalence of the target population. (2)

Documentation in the literature has shown an increased prevalence of fluorosis, most probably related to ingestion of fluoridated toothpaste. Adult supervision of brushing is recommended, with only a pea-sized portion of toothpaste to be used. Inappropriate prescriptions for dietary fluoride supplements may also be a factor in the increased

Fluoride Use Controversy

prevalence of fluorosis. According to the IHS oral health survey of dental patients conducted in 1991, mild fluorosis was found in about 16 percent of the children ages 12-13 years. (3)

The use of fluoride in its various modalities has been a sometimes controversial but well researched area of science. The latest controversy arose during 1990 over release of the results of a study by the National Toxicology Program (NTP). The NTP study reported equivocal or “uncertain” results concerning the possibility of a carcinogenic effect of fluoride in male rats, while no effect was seen in mice or female rats. These results prompted a thorough review by the U.S. Public Health Service of existing scientific research into the risks and benefits of fluoride. The resulting report, *Review of Fluoride Benefits and Risks*, reaffirms the safety and effectiveness of the use of fluoride in preventing dental caries. No evidence establishing an association between fluoride and cancer was found. Concerning water fluoridation, the report acknowledged that although the degree of measurable benefits has been reduced recently as other fluoride sources have become available in non-fluoridated areas, the benefits of water fluoridation are still clearly evident. (4)

References

1. Caries Diagnosis and Risk Assessment: A Review of Preventive Strategies and Management. Special Supplement of The Journal of the American Dental Association, Vol. 126, June 1995.
2. Ripa, LW. A critique of topical fluoride methods (dentifrices, mouthrinses, operator, and self-applied gels) in an era of decreased caries and increased fluorosis prevalence. J Public Health Dent. Vol. 51, No. 1. 1991. 23-41.
3. The Oral Health of Native Americans. Unpublished findings of a 1991 survey conducted for dental patients by the IHS Dental Program.
4. U.S. Department of Health and Human Services, Public Health Service *Review of Fluoride Benefits and Risks*. A Report of the Ad Hoc Subcommittee on Fluoride of the Committee to Coordinate Environmental Health and Related Programs. February 1991.

Additional Reading

1. Ripa, LW. A half-century of community water fluoridation in the United States: review and commentary. J Pub Health Dent 1993;53(1):17-44.

2. Symposium of appropriate uses of fluoride in the 1990's. J Pub Health Dent
1991;51(1).

Community Water Fluoridation

Definition

Community water fluoridation is the deliberate adjustment of the natural trace element fluoride to promote the public's health through the prevention of dental caries. Fluoride is found naturally in all soils and existing water supplies. It is also present in animal and plant food consumed by people.

Benefits

Community water fluoridation is one of the most successful public health disease prevention programs ever initiated. It has the potential to benefit all age groups and all socioeconomic strata, including the lowest, which has the highest caries prevalence and is least able to afford preventive and restorative services. (1) Community water fluoridation is also the most cost-effective of all community-based caries preventive methods. An effective community water fluoridation program should be the cornerstone of all public oral health programs. The efficiency of drinking water fluoridation in reducing dental caries has been demonstrated in surveys conducted in the United States as well as several other countries for the past fifty years. Early water fluoridation studies reported caries reductions of approximately 40 to 60 percent for the permanent dentition and slightly lower reductions for deciduous teeth. Recent studies have found a smaller difference in the caries prevalence between optimally fluoridated and fluoride-deficient communities. (1) In American Indian/Alaska Native populations the expected reductions in disease may be even greater, given the high caries rates.

According to the 1991 oral health survey of dental patients conducted by the Indian Health Service (IHS), patients with access to fluoridated water averaged a lower rate of proximal surface decay in the 15-44 year old age cohort. Children aged 15-19 had the greatest reduction (31%) because adults experienced most of their tooth decay before water fluoridation was generally available on Indian reservations. (2)

History of Water Fluoridation in the IHS

In 1959, Public Law 86-121 was passed. This piece of legislation was probably one of the most important documents for Indian people. The law provided for the installation of water systems for Native American communities upon Tribal request. Sanitary water facilities became a reality through this legislation.

IHS Surveillance System

In 1981, the IHS established a surveillance system to monitor 325 systems which had fluoridation equipment. There was a two percent compliance rate at that time.

In 1985, Area and Service Unit Fluoridation Teams were established. These teams consisted of representatives from a variety of disciplines including: dental, environmental health and engineering, health education, pediatrics, public health nursing, pharmacy,

and, of course, the water operator or water utility. A policy for the implementation and operation of the water fluoridation program was also developed at this time.

The IHS recently revised its policy and is available through the Area or Headquarters Dental or Office of Environmental Health and Engineering (OEH & E) programs. It should be read by all dental care providers. (3)

Recently, the Centers for Disease Control and Prevention (CDC) developed a manual entitled, "Engineering and Administrative Recommendations for Water Fluoridation, 1995." This document provides guidelines for state and local public water systems. (4)

Additional
Resource

Status of Community Water Fluoridation

Currently, the IHS provides surveillance for about 500 community water systems that serve AI/AN people. Approximately 80 percent of these systems serve fewer than 500 people.

One of the oral health objectives for the year 2000, is to provide *optimally fluoridated* water to 60 percent of AI/AN people with access to community water fluoridation. If that goal is to be reached, there must be collaborative partnerships established between Tribal programs and local and state health departments.

Recommendations for Fluoridated Community Water Systems

Administration

Primary Responsibility

The community or water system owner, with professional training and technical assistance, is primarily responsible for assuring the ongoing operation of fluoridation equipment and maintaining surveillance and records of operation. A reliable, frequent monitoring and surveillance process must be in place to assure compliance and thus the maximum benefit of water fluoridation. Training of water operators is also a critical element in assuring AI/AN communities the dental benefits of community water fluoridation.

Fluoridation Teams

Fluoridation teams should be established at each Service Unit or Tribal program and at the Area and Headquarters levels. Each team should include water plant operators, Tribal representatives, dental professionals, engineers, sanitarians and other community health workers involved in water fluoridation. Regular meetings of the fluoridation teams provide a good means of identifying problems in the fluoridation program and developing strategies to solve these problems.

Following is a list of activities in which the fluoridation team should be involved:

1. Review current water fluoridation system compliance and identify any problem areas.
2. Work to increase compliance for problematic systems and delegate responsibilities to each team member.
3. Encourage and support training to increase both technical and public relations skills.
4. Educate the community and market the benefits of water fluoridation through:
 - a. Group presentations (Tribal health groups, PTA, Head Start, WIC).
 - b. Media (TV, radio, newspapers).
 - c. Posting the water fluoridation levels in public places.
 - d. Educating the medical staff.

Note: The IHS has developed a slide presentation entitled, “Fluoridation — Healthy Smiles for Healthier Indian Communities,” which can be used for group presentations. Contact your Area Dental Program, Area OEH & E, Headquarters Dental Branch, or Headquarters Environmental Management Branch.

Additional
Resource

5. Maintain communication with the state dental and state drinking water programs regarding aspects of water fluoridation.

Monitoring and Surveillance

The following surveillance system is recommended by the IHS:

- | | |
|---|-------------------|
| <ol style="list-style-type: none"> 1. Collect weekly reports from the water plant operator. It is recommended that water operators monitor the fluoride on a daily basis. | Weekly Reports |
| <ol style="list-style-type: none"> 2. Obtain a water sample on a monthly basis for split-sampling procedures. Each Area should have procedures to verify quality in fluoride analysis. | Split-Sampling |
| <ol style="list-style-type: none"> 3. Contact the water plant operator if results are not in the correct range. (The IHS allows .1 ppm below and .5 ppm above the optimum fluoride level established for your region of the country.) See Table 1. | |
| <ol style="list-style-type: none"> 4. Send or transmit reports to the Area OEH & E or Dental Program at least once per month. A monthly report can be generated by Areas and/or Service Units/Tribal Programs by the DDS Water Fluoridation Module. The Dental Program and the Environmental Management Branch (EMB) at Headquarters West (Albuquerque, NM) creates a quarterly report for the Areas. | Data Transmission |
| <ol style="list-style-type: none"> 5. Areas should designate sites to participate in the Centers for Disease Control and Prevention’s (CDC’s) Proficiency Testing Program. This program allows for a check on equipment to assure accurate readings are being reported. Contact CDC’s Division of Oral Health or your Area Dental Consultant, Prevention Coordinator, or Operation and Maintenance (O & M) Fluoridation Coordinator for information on this program. | Proficiency |

Table 1

Recommended Optimal Fluoride Levels for Community Public Water Supply Systems (5)

Annual Average of Maximum Daily Temperatures F	Recommended Fluoride Conc. (ppm)	Allowable Range of Fluoride Conc. (ppm)
40.0 – 53.7	1.2	1.1 – 1.7
53.8 – 58.3	1.1	1.0 – 1.6
58.4 – 63.8	1.0	0.9 – 1.5
63.9 – 70.6	0.9	0.8 – 1.4
70.7 – 79.2	0.8	0.7 – 1.3
79.3 – 90.5	0.7	0.6 – 1.2

The fluoride level in water systems should be maintained as close to the recommended concentrations as possible. These values are based on annual average temperatures. (See Table 1.)

Technical Assistance and Training

The IHS Office of Environmental Health provides technical assistance where surveillance reveals a problem and/or when it is requested by the Tribe or the community. On-going training for the operators is also provided. The CDC also provides training for water system operators and others involved in the fluoridation programs. The CDC has developed manuals for operators as well as engineers and technicians. (5)

Additional
Resources

Safety of Community Water Fluoridation

Community water fluoridation is a safe and cost-effective method to ensure the oral health of all people. Technical requirements are outlined in the recently published guidelines from CDC and they should be followed by all IHS and Tribally-managed fluoridated water systems. These guidelines also establish recommended emergency procedures for fluoride overfeeds. Specific actions should be taken when equipment malfunctions or an adverse event occurs in a community public water supply system that causes a fluoride chemical overfeed. (See Table 2.)

Safety Guidelines

Most overfeeds do not pose an immediate health risk; however, some fluoride levels can be high enough to cause immediate health problems. All overfeeds should be corrected immediately because some have the potential to cause serious long-term health effects. (4)

When a fluoride test result is at or near the top end of the analyzer scale, the water sample must be diluted and retested to ensure that high fluoride levels are accurately measured.

CDC has also published recommendations for treatment if a person ingests dry fluoride chemicals (NaF and Na_2SiF_6). (See Table 3.)

TABLE 2**Recommended Fluoride Overfeed Actions for Community Water Systems (4)**

Fluoride Level	Actions Recommended
0.1 mg/L above control range to 2.0 mg/L	<ol style="list-style-type: none">1. Leave the fluoridation system on.2. Determine malfunction and repair.
2.1 mg/L to 4.0 mg/L	<ol style="list-style-type: none">1. Leave the fluoridation system on.2. Determine malfunction and repair.3. Notify the water plant operator supervisor and report the incident to the appropriate IHS OEH & E office or county or state agencies.
4.1 mg/L to 10.0 mg/L	<ol style="list-style-type: none">1. Determine malfunction and immediately attempt repair.2. If the problem is not found and corrected quickly, turn off the fluoridated system.3. Notify the water plant operator supervisor and report the incident to the appropriate IHS OEH & E office or county or state agencies.4. Take water samples at several points in the distribution system and test the fluoride content. Retest if results are still high.5. Determine malfunction and repair. Then, with supervisor's permission, restart the fluoridation system.
10.1 mg/L or greater	<ol style="list-style-type: none">1. Turn off the fluoridation system immediately.2. Notify the water plant operator supervisor and report the incident immediately to the appropriate IHS OEH & E office or county or state agencies and follow their instructions.3. Take water samples at several points in the distribution system and test the fluoride content. Retest if results are still high. Save part of each sample for the state laboratory to test.4. Determine malfunction and repair. Then, with supervisor's and the state's permission, restart the fluoridation system.

TABLE 3

**Recommended Emergency Treatment for Persons Who Ingest
Dry Fluoride Chemicals NaF and Na₂SiF₆ (4)**

Milligrams Fluoride Ion (mg) Ingested Per Body Weight (kg)*	Treatment
≤5.0 mg of fluoride ion/kg	<ol style="list-style-type: none"> 1. Give calcium (milk) orally to relieve gastrointestinal symptoms. Observe for 2–4 hours. (A can of evaporated milk should be available at all times to use for emergency treatment.) 2. Induced vomiting is not necessary.
>5.0 mg of fluoride ion/kg	<ol style="list-style-type: none"> 1. Move the person away from any contact with fluoride and keep him or her warm. 2. Call the Poison Control Center. 3. If the person is conscious, induce vomiting by rubbing the back of the person's throat with either a spoon or your finger or giving the person syrup of ipecac. To prevent aspiration of vomitus, the person should be placed face down with the head lower than the body. 4. Give the person a glass of milk or any source of soluble calcium (i.e., 5% calcium gluconate or calcium lactate solution). 5. Take the person to the hospital as quickly as possible.

*Average age/weight: 0–2 years/0–15 kg; 3–5 years/15–20 kg;
6–8 years/20–23 kg; 9–15 years/23–45 kg; 15–21 years and higher/45–70 kg.

References

1. Ripa LW. A half century of community water fluoridation in the united states review and commentary. J Pub Health Dent 1993; 53(1):17-44.
2. The Oral Health of Native Americans. A Chart Book of Recent Findings, Trends and Regional Differences. 1994. (unpublished)
3. Indian Health Service Circular No. 94-1, Water Fluoridation Policy Issuance, 1994.
4. Engineering and Administrative Recommendations for Water Fluoridation, 1995. Centers for Disease Control and Prevention. MMWR September 29, 1995/Vol. 4/No. RR -13.
5. Water Fluoridation A Manual for Engineers and Technicians. US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention.

School Water Fluoridation

Where community water supplies cannot be fluoridated for programmatic, political, or engineering reasons, fluoridation of the water supplies serving schools should be accomplished.

Because of safety issues, the IHS recommends that school water systems fluoridate at the same levels as the community water systems.

Fluoridation

Only schools capable of adequate operation, control, and monitoring of fluoridated systems should be considered for fluoride adjustment.

Some questions which should be answered prior to implementing a school water fluoridation program include:

Considerations

1. What are the caries rates in the community?
2. Who has access to the school water? Is it only schoolchildren who drink the water, or do community members use it as well?
3. Who will manage the water system? Is the person trained?

Please consult your Area Dental Consultant, Area Prevention Officer, or Area Fluoridation Team to discuss these questions and the school fluoridation policy in your Area.

References

1. Engineering and Administrative Recommendations for Water Fluoridation, 1995. Centers for Disease Control and Prevention. MMWR. September, 1995/Vol. 44/ No. RR 13.
2. Proceedings for the workshop: Cost effectiveness of caries pre-vention in dental public health. Ann Arbor, Michigan, May 1989.
3. Indian Health Service Circular No. 94-1, Water Fluoridation Policy Issuance, 1994.

Dietary Fluoride Supplements

There have been few well-conducted surveys to demonstrate the effectiveness of fluoride supplements. One study in school-age children showed a 29% reduction in caries. A potential cause for fluorosis can exist if physicians or dentists do not know if the community where the child resides is fluoridated. Therefore, it is important to include the pediatricians, public health nurses (PHN), pharmacists, and other providers in the discussion on fluoride supplements for AI/AN children.

Suggestions

A few suggestions are listed below:

1. Work with the Office of Environmental Health and Engineering (OEH&E) personnel to obtain or generate a list of water supplies and their fluoride content. You might use a map and mark each water supply by its fluoride content. You should include those water supplies with natural fluoride levels too.
2. Establish a quality assurance system for water system testing. The ion electrode method is required. Some questions to answer include a) How will water be collected? b) Who will do the testing? c) How will results get returned to the person prescribing? Be sure to enter water fluoride levels in the patient's chart. You may also want to keep a log of each address and the level of fluoride in the water for future reference.
3. Identify an interested health professional(s) to be responsible to assist with the infant supplement program. Screen the infant's water supply at *one* pre-established encounter: a) prenatal visit, b) at the hospital after childbirth, c) first clinic visit, d) home visit, e) first WIC visit, etc. The program will be more effective if only a few people are responsible and all infants are screened at one pre-determined encounter.
4. Develop a written protocol by Area and/or Service Unit/Tribe. Standing orders for the prescription may be used. Dosage should be in accordance with the ADA Schedule found in Table 4.
5. Establish a mechanism to track compliance and to remind patients of the importance of the fluoride supplementation.

Table 4
Recommended Daily Fluoride Supplement (1)

Fluoride Dose			
Age	<0.3 ppm	0.3 to 0.6 ppm	>0.6 ppm
6 months to 3 years	0.25 mg	0	0
3 to 6 years	0.5 mg	0.25 mg	0
6 to 16 years	1 mg	0.5 mg	0

Samples of Systemic Fluoride Prescriptions

Age: 6 mo. Rx Sodium Fluoride Drops
 Sig. 0.25 mg fluoride
 Place drops inside cheek once a day.
 Refills 1 time per year.

Age: 5 yrs. Rx Sodium Fluoride Tablets
 2.2 mg. (1 mg. elemental fluoride) Dis. 120
 Sig. One tablet should be chewed and swished (for one minute),
 then swallowed.
 Use at bedtime after brushing.
 Refills 3 times in 1 year.

Note: Fluor-a-day by Pharmascience has fluoride tablets in 0.25 mg, 0.50 mg, and 1.0 mg doses. All tablets are sweetened with xylitol and are raspberry-flavored. Luride Lozi-Tabs from Colgate also contain the same 3 dosages and are sugar-free and saccharin-free. (vanilla-flavored for 0.25 mg tablets, grape for 0.50 mg tablets, and cherry-flavored for 1.0 mg.)

6. Reinforce health professionals outside the dental clinic who are screening patients for appropriateness.

Procedures for Prescribing Systemic Fluoride Supplements

Guidelines

The following guidelines are for prescribing systemic fluoride supplements for those children who are not receiving optimal systemic fluoride:

Ion Electrode Testing

1. Test the water supply using the ion electrode method and make a note in the chart for the entire family. Add the fluoride results to the preventive assessment section on the dental exam form. Testing can be avoided if the water supply's fluoride content is already known. This information can often be obtained from the State Health Department or OEH & E professionals.

Rx

2. Write the appropriate prescription and instruct the parent that the tablets should be chewed and swished before swallowing when possible. Drops may be used instead of tablets for infants. Be sure to inquire as to whether there are other young children in the home and use this opportunity to prescribe the appropriate dose for each child.

Counseling

3. Counsel the parents on the importance of systemic supplementation. The parents are much more likely to comply if they thoroughly understand the significance of the prescription. It will also increase compliance to help the parent arrange the best time to fit this new habit into their daily routine.

Compliance Check

4. On return visits, check for compliance and further counsel the parent(s) if there is noncompliance. Document each counseling session in the chart.

When prescribing fluorides, you have an excellent opportunity to educate the patients and parents of the importance of water fluoridation. Example: "Since your water is not fluoridated, you need to supplement your diet with a fluoride tablet."

Action

Chew, Swish, and Swallow

The action of a fluoride supplement is both topical when chewed and systemic when swallowed. The topical benefits are greatly increased if the child chews the tablet and swishes for one minute before swallowing. There is some evidence that a fluoride tablet consumed one time a day has a different efficiency as compared to low doses throughout the day, e.g., drinking fluoridated water. Fluoride drops are recommended for infants.

Note: Children who are totally breast-fed, even in a fluoridated community, should receive a fluoride supplement because of the low fluoride content in breast milk.

Breast-Fed
Children

Fluoride combined with vitamins may be used. Although combining use of fluorides with vitamins may improve motivation of some parents, the parent or guardian should be educated to the continued need for fluoride if use of the vitamins are discontinued.

Vitamins with
Fluoride

Fluoride supplements may be provided on an individual or family basis at home or in schools. The advantage of a home-based program is that there are no interruptions during school vacations, and supplementation may begin from birth. Compliance, however, is a problem. A school-based program may ensure that all children have access to fluoride supplements despite lack of family compliance. School-based programs generally have a higher compliance, although some schools question the legalities of dispensing a prescribed item.

Home-Based

School-Based

Prenatal Fluoride Supplementation

Prenatal fluoride supplementation is not recommended at this time because of inadequate clinical documentation of effectiveness.

Safety

The dental professional must be aware of the potential for acute or chronic toxicity problems when using supplements or combinations of fluoride delivery methods. When prescribing dietary fluoride supplements, the dentist must take into consideration the patient's age as well as the fluoride ion concentration available in the primary water source in order to recommend the correct daily dose. Recent evidence indicates that ingestion of fluoride supplements can be a risk factor for fluorosis. The most critical period for fluorosis development in the aesthetically important central and lateral incisors is in the second to third years of life, rather than early infancy.

As a safety precaution, the ADA makes the following recommendations:

Safety Precautions

1. Do not store large quantities of sodium fluoride in the home.
2. When prescribing fluoride supplements, no more than 264 mg of sodium fluoride (120 mg fluoride) should be dispensed at one time. In order to comply with this recommendation, commercial fluoride preparations available for home use are generally dispensed in bottles of 100 to 120 tablets. Fluoride rinses and gels recommended for home use are also prescribed in these recommended amounts.

3. In addition to the use of the child-proof container, each package dispensed should be also bear the statement: **Caution: Store Out of Reach of Children.**
4. If it is determined that a young child is swallowing rather than expectorating a topical fluoride agent (such as toothpaste) on a regular basis, the therapy should be modified, closely supervised, or discontinued until age five.
5. For dental clinics or institutions that store systemic or topical fluoride preparations in amounts that may be harmful if consumed at one time, it is essential that these supplies be kept in a locked storage area. A current inventory should be maintained in order to readily determine any missing supplies. (1)

If an individual is known or suspected to have taken a potentially toxic amount of fluoride, first aid consists of inducing vomiting as quickly as possible or ingesting a material to bind fluoride - milk is usually the most readily available. Identify the source of fluoride and amount consumed, if known. Observe the patient and refer to a medical facility, if necessary.

Recommendations

1. Follow the new dosage schedule to prescribe F supplements when needed.
2. Prescribe F supplements for children who are at moderate or high risk for caries.
3. Compliance is necessary for supplementation to be effective, so the importance of giving the child a tablet every day should be emphasized. If vitamins are being taken, *Poly-Vi-Flor* may be used; this may increase the compliance for fluoride ingestion.
4. The water source must be tested before prescribing F supplements.
5. Follow safety precautions in dispensing and storage of F supplements.

Reference

1. American Dental Association, Council on Dental Therapeutics. Accepted Dental Therapeutics. Chicago, The Association, 1994.

Additional Readings

1. Journal of Public Health Dentistry. Volume 49, Number 5, Special Issue 1989. Proceedings for the Workshop: Cost Effectiveness of Caries Prevention in Dental Public Health. Ann Arbor, MI May 17-19, 1989, Ed. B.A. Burt.
2. A Guide to the use of Fluoride for the Prevention of Dental Caries. Journal of the American Dental Association, 1986.

Topical Fluorides

Fluoride Dentifrices

Fluoride Concentration

Used regularly, a fluoride dentifrice has the potential of reducing the incidence of dental caries by 15 to 30 percent. The recent decline in the prevalence of dental caries can be mainly attributed to the use of fluoridated toothpaste. Approximately 95% of all toothpastes on the market contain fluoride. The majority of the fluoride-containing dentifrices marketed in the United States contain approximately 0.1 percent fluoride (1000 ppm). A one-gram ribbon or pea-sized amount of the dentifrice on a toothbrush contains approximately 1 mg fluoride. *Aim* toothpaste has 1800 ppm. Colgate's new *PreviDent* contains 5000 ppm fluoride and *Gel Kam* contains 968 ppm fluoride (the latter two are available by prescription only).

Swallowing of Toothpaste

Children under the age of five years have a tendency to swallow one-third or more of the dentifrice used. In fluoridated communities, parents should be cautioned to use very small amounts of the fluoridated dentifrices and to teach their children to spit out, not swallow the toothpaste. Frequent or continued swallowing of the fluoridated dentifrice will result in fluorosis on the permanent incisors.

Special Toothpastes

Various toothpastes are promoted as "anti-cavity, anti-gingivitis, and anti-sensitivity." The product choice depends on the needs of the patient. For adults with high caries rates, recommend one with more fluoride. Stress the importance of brushing 2-3 times per day, especially at bedtime.

Fluoride Toothpaste Use For Young Children

The use of a dentifrice should begin as soon as the deciduous teeth begin to erupt into the mouth of the infant. Initially, the parent should be advised to gently swab the teeth with a cotton-tipped applicator or a gauze or washcloth dipped in a very small amount (pea-sized) of the dentifrice. As soon as the infant will tolerate brushing, the parent should begin using a small, soft-bristled toothbrush with a small amount of dentifrice. Parents can serve as role models for the child by brushing themselves.

Potential for Mild Fluorosis

Studies have shown that the use of fluoride toothpaste from an early age is associated with higher levels of very mild fluorosis. Because toothpaste tastes so good, children tend to swallow it. Very young children are also not capable of spitting out excess toothpaste. Swallowing toothpaste is the biggest risk for fluorosis. According to the 1991 IHS Oral Health Survey, only a small percentage of children had mild fluorosis.

A 1991 workshop on fluoride intake recommended that toothpaste manufacturers should package toothpaste in dose-regulating pump containers or tubes with smaller openings. For children under age 6 years of age, recommend a pea-sized amount of toothpaste. Parents/guardians should supervise toothbrushing until the child is at least age 6 years old.

Proper Amount

The cost of toothpaste may be a significant expense and/or a low priority for some families. The dental clinic or community-based program may want to consider providing toothpaste for families whose members are at high risk for caries.

School Toothbrushing Programs

School brush-ins can also be encouraged (especially in boarding schools) in order to help children form the habit of daily brushing. Daily brushing and plaque removal are essential for the control of periodontal disease.

Brush-Ins

Approximately 28,000 AI/AN children participate in school-based toothbrush programs. School-based toothbrush programs should be implemented for all Indian schools. In those schools in which more than 25 percent of the students are AI/AN, consider implementing a program. For those schools with less than 25 percent AI/AN children, try to develop linkages with the local or state dental health department in order to make these programs available to more children.

AI/AN
Participation

The Dental Program should identify the schools within the service area and determine where programs could be implemented. Proper planning for these programs includes obtaining necessary approvals from the principals and school board members and parents. Placing consent forms in the school registration packets is an efficient method for obtaining parental permission and can increase participation in these programs.

Consent Forms

Follow the IHS guidelines on storage of toothbrushes.

General Dentifrice Recommendations

1. Use a pea-sized portion for children under age 6 years. Parental supervision for brushing should continue until the child is 6-7 years old. Encourage parents to use a small brush or finger cloth as soon as teeth erupt. For children under age 6 years, do not recommend a toothpaste with more than 1000 ppm of fluoride.
2. Use *Extra-Strength* or a prescription fluoride toothpaste (to be used at bedtime) for those children over age 6 years and adults at high risk for caries (rampant caries).

3. Encourage daily use of fluoridated toothpaste as part of oral hygiene instructions. Daily use of fluoride toothpaste is probably the most effective preventive regimen for caries control.
4. Consider providing small tubes of F toothpaste for moderate-risk to high-risk patients in the clinic. This is a marketing tool that is also used in private practice settings.
5. Implement brushing programs in schools. It is a cost-effective regimen to provide fluoride for children. See CDC guidelines on proper handling of brushes at school. (Head Start performance standards require that children brush at school after meals.)

Fluoride Mouthrinses

NaF Concentrations

The idea of preventing caries by mouthrinsing with dilute F solutions has been promoted for many years. Sodium fluoride has been tested extensively and is the most commonly used rinse in public health programs. NaF has been tested as a weekly rinse at 0.2% F, and at 0.05% for daily rinsing. The caries reductions are very similar with both solutions. For school-based programs, the cost and practicality of a weekly program is preferred.

For individual use at home, a daily rinse is recommended for children and adults who are at moderate or high risk for dental caries. Other high-risk patients might include those children with orthodontic appliances and adults undergoing radiation therapy. For AI/AN adults who are sensitive to alcohol, recommend *Act* (for children), as it contains no alcohol.

Fluoride Rinse Examples

Three examples of over-the-counter fluoride rinses approved by the ADA. There are:

<i>Act</i>	for children, contains no alcohol (0.05% NaF)
<i>Fluorigard</i>	(0.05% NaF)
<i>Stancare</i>	(0.1% SnF ₂)

Note: Mouthrinses are not recommended for children under age 6 years.

By the age of six years, most children can master the rinsing technique and minimal solution will be swallowed. At this age the permanent incisors should have completed the mineralization process such that the accidental ingestion of some of the rinse solution would have little effect on the appearance of the child's teeth as a result of fluorosis.

School Fluoride Mouthrinse Programs

School fluoride mouthrinse (FMR) programs can be an effective measure to control dental caries. Studies in schools using NaF and APF rinses have shown a reduction in caries from 20-35 percent over periods of 2-3 years. Benefits can be retained for 2-3 years after completing a school FMR program. In the IHS, there are approximately 74,000 children participating in school fluoride mouthrinse programs. The average annual cost is about \$1.00–1.50 per child.

Caries Reduction
Levels

Cost

Recent studies of fluoride mouthrinse programs have questioned their effectiveness, particularly in communities with fluoridated water. While cognizant of these studies, the IHS Dental Program believes that the high caries rate seen in AI/AN children warrants the use of fluoride mouthrinse programs.

Effectiveness

However, before implementing a FMR program, the following criteria should be considered:

FMR Program
Criteria

1. Caries rates in the community, especially smooth-surface caries (determine through low-level monitoring or survey results).
2. Prevalence of use of fluoride toothpaste (determine through assessment method — ask patients if they use it or consider market consumption through local stores).
3. Status of community or school water supply for at least five years (determine through OEH or State records).
4. Willingness of school administrators to allow student participation.
5. Availability of resources for program.
6. Whether schools consist of at least 25-50 percent AI/AN children. Joint collaboration between state/local health department and IHS/Tribal program should be investigated.

The following steps should be taken when implementing a school-based fluoride mouthrinse program:

1. Contact school administrators once program is identified as needed. Estimate start-up and annual costs as well as teacher and class time.
2. Educate administrators/school officials and community members.

3. Train person(s) who will administer fluoride mouthrinse program.
4. Order supplies: jugs, packets, cups, napkins.
5. Obtain consent from parents or guardians.
6. Monitor program by keeping track of number of students participating, and the amount of supplies used.
7. Provide incentives or rewards to classrooms and children.
8. Recognize efforts of teachers, community health aides, community health representatives (CHRs) or parent volunteers who are doing a good job.

Safety Issues

Fluoride Storage

Schools and other institutions that provide a FMR program must be careful to keep the fluoride in a locked storage area that is isolated from children or patients. Adequate administrative controls and record-keeping are also required. The amount of fluoride in a one liter container of 0.2 percent NaF solution or in a two or three gram NaF pre-measured packet is potentially lethal if consumed at one time.

Dosage

When dispensing fluoride products for a mouthrinse application, one teaspoonful (5 ml) of a 0.05 percent solution contains approximately 1 mg F, which is equivalent to the amount of fluoride in one 2.2 mg NaF tablet. Thus, ingestion of this amount of fluoride will cause no untoward effects. Two teaspoonsful (10 ml) of a 0.2 percent NaF solution contain 9 mg F, the equivalent of nine NaF tablets. If all 10 ml are swallowed, the patient may become nauseous.

For patients with handicapped conditions in which it is known that some or all of the mouthrinse will be swallowed, they should be placed on a daily 0.05 percent NaF regimen.

The FMR program should be evaluated periodically to assess effectiveness. Several process and outcome methods may be used, such as:

1. Patient/community/staff satisfaction survey
2. Number of students participating and the quantity of supplies used during the year

3. Improvement in oral health from baseline to present (after minimum of three years)

Note: A school fluoride mouthrinse manual has been developed by the Oklahoma Area and is available upon request through the Area Prevention Officer or IHS Dental Disease Prevention Consultant.

Additional
Resource

Conclusions/Recommendations

1. Fluoride mouthrinses should not be used for children under 6 years of age.
Fluoride mouthrinses are *not* recommended for children in Head Start programs.
2. For patients at moderate to high risk for caries, daily use of fluoride mouthrinses is recommended.
3. For most Indian communities, school-based fluoride mouthrinse programs are recommended, even in fluoridated communities. Adoption of FMR programs in Urban communities should be based upon cost and caries status of schoolchildren. Local, county, and state health departments can become partners in providing fluoride benefits to all children. Fluoride mouthrinse programs, although most easily implemented in elementary schools, are of greater benefit to junior and senior high school students. That is when the permanent teeth have fully erupted and are at greater risk for smooth-surface caries.

Head Start

Professionally-Applied Gels

The professional topical application of fluoride is an accepted caries-preventive procedure that is appropriate for children, adolescents, and adults. Topical fluorides are also useful when applied to exposed root surfaces. This is especially beneficial for older patients, who are vulnerable to root caries and root sensitivity as a result of the loss of periodontal attachment and/or xerostomia (dry mouth).

Root Caries

As a public health measure, targeting those at higher risk for caries is a cost-effective procedure. Criteria for moderate-risk to high-risk children, adolescents, and adults might include the following: those patients who have more than one active smooth-surface carious lesion; white spot lesions; poor oral hygiene; and/or past history of caries.

Three agents are currently available for use in operator-applied topical fluoride programs: sodium fluoride (NaF); stannous fluoride (SnF₂); and acidulated phosphate fluoride

(APF). When used properly, all seem to be equally effective and are capable of inhibiting dental caries up to 30 percent.

APF gels are the most popular, due to their ease of use as well as taste preference. APF contains 1.2 percent F ion, has a pH of between 3.0 and 4.0 and is available in either an aqueous solution or a gel. Thixotropic gel formulations are easier to use and more likely to reach caries-susceptible interproximal areas.

Note: For young children, fluoride foam applications are now available. Neutral sodium F foam is obtainable through Laclede Company and Colgate (FluoroCare). These products do not use a thixotropic gel and contain less fluoride mass, although the concentration is similar. Therefore, the risk for swallowing the product is reduced. These neutral sodium fluoride topical regimens are also safe to use on patients with porcelain or composite restorations.

Guidelines for Fluoride Gel Application

1. Clean teeth with a toothbrush to remove debris. A toothbrush prophylaxis can remove any debris and also provide an instructional time for the patient. *Note: It is not necessary to do a rubber cup prophylaxis on patients before providing the topical fluoride treatment. However, any calculus should be removed and the patient allowed to rinse his or her mouth with water before applying the fluoride.*
2. Apply gel in disposable tray for both maxillary and mandibular teeth. Limit the amount of gel in the tray to 1/4 to 1/2 full.
3. Sit patient upright in chair. Dry teeth with air. Insert trays in mouth.
4. Have patient bite down on trays for 4 minutes. A saliva ejector should be used to control moisture. The patient should not be left unattended.

Note: It has been clinically demonstrated that up to 90% of fluoride uptake occurs in the first minute. Therefore, if the patient is uncooperative, a shorter time than 4 minutes could be used, depending on the provider's judgment. One-minute gel applications are being considered for ADA's seal of approval.

5. Remove trays and instruct patient to spit out excess gel.
6. Instruct patient to refrain from eating or drinking for 30 minutes.

Note: Fluoride may also be painted on teeth using cotton rolls and isolation technique for young child, or if the child is uncooperative or gags easily.

Patient Selection for Fluoride Gel Application

The IHS Dental Program recommends targeting this procedure to moderate-risk and high-risk patients, due to its high cost compared to alternative forms of fluoride delivery. Those patients with one or more smooth-surface carious lesions, white spot lesions, past history of decay, and/or poor oral hygiene should receive gel applications every 6 months or more frequently, depending on the severity of the caries rate and local resources. The use of fluoridated toothpaste and other self-applied fluorides should be stressed between recalls.

IHS
Recommendation

Safety

Operator-applied topical fluorides are highly concentrated formulations of fluoride and are not meant to be swallowed. No more than five ml of aqueous solution or gel should be used for a professional application of topical fluoride. Depending on the formulation, five ml contains from 45 to 100 mg of fluoride. Although this concentration is not lethal if swallowed, even for a small child, the concentration is high enough to make the patient nauseous.

Amount

If accidental swallowing occurs, administer milk or an antacid, which will bind the fluoride, and seek medical assistance.

Fluoride Varnish

Fluoride varnishes have been used extensively for semi-annual topical fluoride applications in Europe and Canada for many years. They have not been approved by FDA as a caries preventive regimen as yet, but are cleared for approval as a varnish. Discretion by individual dentists is recommended.

The varnish acts as an adhesive and holds F in greater proximity to the tooth surface to enhance the remineralization process. The technique could be used for high-risk patients, including patients with root surface caries and those children with orthodontic appliances.

Slow-Release Fluoride

Incorporating fluoride into dental materials such as dental cements, composites, and pit and fissure sealants does not appear to impart significant clinical anti-caries benefits. The release of fluoride from these materials is short-lived and produces a “burst effect” only, and hence require frequent application. There is more evidence that glass ionomer cements and restorations have a sustained fluoride release and uptake by enamel and dentin. Further studies are needed.

Intra-oral fluoride releasing devices have not been studied enough to make a recommendation at this time.

Additional Readings

1. Caries Diagnosis and Risk Assessment: A Review of Preventive Strategies and Management. Special Supplement of The Journal of the American Dental Association, Vol. 126, June 1995.
2. Symposium on appropriate uses of fluorides in the 1990's. J Pub Health Dent 1991;(51):1.
3. Ripa LW. Review of the anticaries effectiveness of professionally applied and self-applied topical fluoride gels. J Public Health Dent. Vol. 49 Number 5, Special Issue 1989. Proceedings for the Workshop: Cost Effectiveness of Caries Prevention in Dental Public Health. Held at Ann Arbor, MI May 17-19, 1989. Ed. B.A. Burt.
4. Leverett DH. Effectiveness of mouthrinsing with fluoride solutions in preventing coronal and root caries. J Public Health Dent 1989;49(5): 310-16. Proceedings for the workshop: Cost Effectiveness of Caries Prevention in Dental Public Health. Held at Ann Arbor, MI May 17-19, 1989. Ed. B.A. Burt.
5. Burt BA, Eklund SA. Other uses of fluoride in caries prevention. Chapter 13 in Dentistry, dental practice, & the community, 1992.
6. Scheirer MA, Allen B, Rauch, HJ. The Adoption and implementation of the fluoride mouthrinse program: descriptive results from school districts. J Pub Health Dent 1987;47(2):98-107.

Pit and Fissure Sealants

This subsection of the *IHS Oral Health Program Guide* is heavily based on the “Workshop On Guidelines For Sealant Use” contained in the *Journal of Public Health Dentistry*.

Although dental caries prevalence has dramatically decreased in the United States, the disease still affects more than 50 percent of school-aged children and almost all adults. Children from low socioeconomic status families, as well as minorities, American Indians, and Alaska Natives are at higher risk for caries and are less likely than others to receive dental care. Because most childhood caries occurs on tooth surfaces with pits and fissures, the use of dental sealants seems to be a logical approach for further improving children’s oral health. Dentists’ use of sealants in the general population, however, continues to fall short of expectations. However, in the IHS sealant use has increased dramatically since 1985, and approximately 62 percent of children ages 6 to 8 and 14 to 15 years have at least one molar sealant.

Sealant Effectiveness

Sealants have long been shown to be effective in the reduction of pit and fissure caries. A single application of Delton (Johnson & Johnson) was shown to be 84.7 percent effective, and have 87.5 percent complete retention after three years testing by McCune, Bojanini, and Abodeely (1). A two-year study by Sheykholeslam and Houpt had similar results (2).

Doyle and Brose (3) determined the longevity of a pit and fissure sealant to be unaffected by oral hygiene or refined carbohydrates. The majority of sealant loss occurs during the first six months after application (4,5). Cueto and Buonocore report that sealants should be checked every six months (6). Increased effectiveness is shown when newly erupted teeth are sealed and lost sealants are replaced at regular intervals (7).

Charbeneau and Denniston (8) felt that exposure of the terminal ends of occlusal fissures on a tooth with a partially lost sealant may create an environment conducive to caries, because of the incomplete penetration of the sealant material into these fissures. When a sealant is lost, research has shown the surface of the tooth is not predisposed to caries any more than its unsealed contralateral paired tooth surface. Cueto and Buonocore (6) found teeth that have lost sealant are still protected against caries. The treated teeth with partial or complete sealant loss had 71 percent less caries than the controls after one year. Horowitz, et al. (9) reported that sites with partially retained sealant show enhanced protection from caries over controls. They discovered that normal maturation of the tooth enamel is not interrupted when the sealant is placed, and the tooth is not more caries-

susceptible because it was decalcified with acid. This may well be due to retained tags of polymer in the enamel matrix that continue to resist decay.

Sealants are an important dental caries prevention technology, ideally used in combination with patient education, effective personal oral hygiene, fluorides, and regular dental visits. The following principles and scientific facts should underlie the use of pit and fissure sealants in public and private programs.

Principles

- Prevention of dental caries is better than treatment. Therefore, sound nondiseased teeth are more highly valued than adequately restored teeth.
- For equivalent outcomes, the least invasive approach, using the simplest intervention for managing dental caries, is preferred.
- Minimizing the cost of preventing or controlling pit and fissure caries is desirable.
- Strategies for sealant use (e.g. patient selection, clinical decision-making) may differ between individual caregivers and community programs.

Critical Scientific Facts Related to Sealant Use

- Sealants have been demonstrated to be a safe and effective long-term method to prevent pit and fissure caries (10-12).
- Pit and fissure caries attack begins in childhood and continues through adolescence and into adulthood (13-15).
- In addition to preventing carious lesions, sealants can arrest caries progression (16-19).
- Effective sealant use requires meticulous application technique, particularly moisture control (20-21). Sealant retention should be checked within one year of application (20).

Sealant Criteria

Preventative Sealants

All patients having teeth with morphological characteristics that place them at risk of developing dental caries should be considered for *preventive sealant* applications. Under certain circumstances, patients having caries in pits and fissures also are candidates for

Therapeutic Sealants

sealants (16-19). Such sealants will be referred to as *therapeutic sealants*. Although the majority of sealants have been placed in children, recent studies suggest that the risk for pit and fissure caries extends into and well beyond adolescence (13-15). Adults who are at risk for developing lesions in pits and fissures that were previously caries free, as well as those who may require sealant replacements, also should be evaluated for sealants. The goal of preventing caries through the more widespread use of sealants will be best accomplished by providing preventive sealants to individuals at high risk and placing therapeutic sealants on carious lesions limited to enamel.

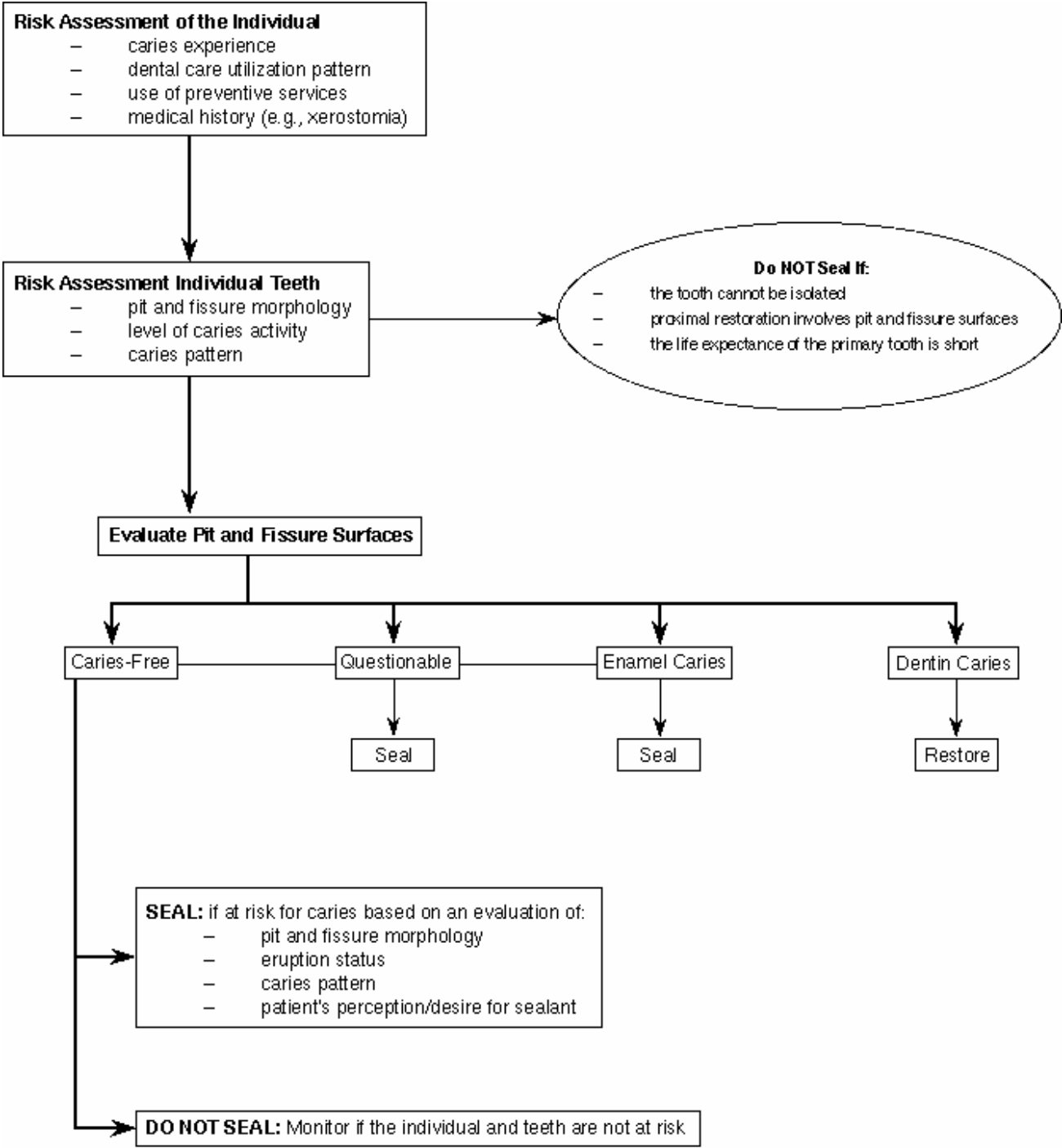
Risk Assessment of Individuals

Determination of the need for sealants begins with an assessment of the individual's risk for dental caries (Figure 1). Factors contributing to an individual's caries risk include caries history in primary and permanent teeth, previous dental care, use of preventive practices, and family and medical history (22-25). Risk for pit and fissure caries varies from one patient to another, and within the same patient from one point in time to another. Changes in habits, life circumstances, health status, and medication use (e.g. anti-sialogogues or sweetened syrups) are known to influence risk for caries (26-27). The different and changing risk profiles among patients in individual patient care programs require continuous monitoring.

Risk Assessment of Teeth

Assessment at the tooth level is performed to determine the need for a sealant. Factors that should be considered are the individual's risk for developing dental caries, level of caries activity, pit and fissure morphology, caries pattern, and life expectancy of primary teeth. Use of sealants also depends on the status of proximal surfaces of the tooth selected for sealing, the eruption status, and the ability to adequately isolate the tooth. Furthermore, the distribution of caries by tooth type provides a clear indication of susceptibility of different teeth to caries. Studies suggest that first and second permanent molars are at greatest risk for pit and fissure caries (20, 21, 28-30). Primary molars, premolars, and permanent maxillary incisors that are at high risk also may need to be sealed. The Native American population tends to show deep

Figure 1
Indications for Sealant Use



lingual pits on maxillary central and lateral incisors, with eventual restoration often required. The limited research that has been done on the sealing of these areas indicates that sealant retention is effective and caries are reduced. Going, et al. (31), after four years of study, found that of the few lingual pits sealed, 50 percent still retained completely the sealant and, while none of the treated teeth decayed, 7.1 percent of the control teeth decayed.

Evaluation of teeth results in pit and fissure surfaces being classified into one of three categories: *caries-free*, *enamel caries*, and *dentin caries*. Although caries diagnosis historically has been performed by a visual-tactile examination, using a mirror and explorer, studies suggest that visual examination of air-dried teeth alone, with or without magnification, may provide comparable or superior diagnoses (32-41). Moreover, probing for dental caries using a sharp explorer with firm pressure may damage noncavitated carious enamel (31,41). Diagnostic techniques now under development may improve our ability to identify dental caries with greater accuracy in the future and reduce patient risk (21). There is a need to establish standards for the diagnosis of dental caries, perhaps through a consensus development conference or other forum. At this time, a prudent approach would be to use light to moderate pressure if using an explorer.

Caries-Free Teeth

The decision to seal a sound or caries-free surface is based principally upon considerations of caries risk as influenced by pit and fissure morphology, eruption status, and caries activity in the mouth (Figure 1).

Pit and Fissure Morphology:

Pit and fissure morphology has been shown to be a significant factor in predicting caries risk (22). Previous guidelines have clearly stated that teeth with well-coalesced pits and fissures and wide, easily cleaned grooves usually do not require sealing (20, 42-44). Teeth with deep pits and fissures that catch an explorer are ideal candidates for sealants.

Permanent molars have the most susceptible pits and fissures. Premolars are much less susceptible to occlusal caries than permanent molars (21, 28-30). Therefore, fewer premolars will be indicated for sealant application than permanent molars. The need for sealant use in first and second primary molars also is determined by the pit and fissure morphology and the life expectancy of the tooth. Primary molars, particularly second molars, may demonstrate deep pits and fissures. Sealants may be indicated on primary molars with clear evidence of pit and fissure caries activity or deep and/or stained fissures, particularly if proximal tooth contact does not exist. In such cases, sealant application is indicated consistent with the overall assessment of the individual's risk and the life expectancy of the tooth.

Eruption Status:

Previous guidelines have stressed the need to seal the tooth immediately after eruption (20, 42, 43). However, studies have suggested that adequate isolation is essential for sealant retention and that sealant success is positively associated with the eruption status of the teeth and the operator's ability to maintain a dry field (12). Whenever possible, therefore, it is recommended that the sealant placement be delayed until the tooth is sufficiently erupted.

In the past, most pit and fissure caries on permanent molar teeth was thought to occur within four to six years after eruption (42,43). Therefore, most existing sealant guidelines recommend that pit and fissure surfaces that have remained caries free for four years or more do not require sealants (42,43). Based on clinical and epidemiologic data, posteruptive age alone should no longer be used as a major criterion for deciding whether a tooth should be sealed. The primary consideration should be the risk of the pit and fissure surface to caries consistent with an individual's overall caries risk at the time of evaluation.

Questionable Caries:

Sometimes it is difficult to distinguish sound pits and fissures from those with caries limited to enamel. In this situation, commonly referred to as *questionable caries* (20), a tooth would be considered at risk for dental caries and should receive a sealant. A sealant placed over a carious lesion limited to enamel will prevent the progression of undiagnosed caries, should it be present. This approach is justified since it has been shown that if a diagnostic error occurs and caries is sealed, the lesion will not progress, but will arrest, provided the sealant remains intact (16-19).

Caries Pattern:

If the pattern of caries indicates susceptibility to pit and fissure caries, as evidenced by the occurrence of one or more lesions per year, it is advised that the remaining caries-free pit and fissure surfaces of teeth at greatest risk be sealed. If an individual demonstrates proximal caries activity, sealants still may be indicated for noncarious occlusal surfaces. The conservation of occlusal surfaces always should be considered when restoration of proximal surfaces of teeth is undertaken. Several conservative approaches to managing posterior proximal caries can allow independent management of the proximal and occlusal aspects of the same tooth. Conservative procedures for management of proximal caries on posterior teeth may range from remineralization protocols to direct access restorations, including posterior Class III glass ionomer restorations and slot preparations combined with conventional restorative materials (21, 45-53).

Enamel Caries

Enamel lesions are those in which demineralization is confined to the enamel. Upon visual examination, the tooth demonstrates a white halo of opacity or chalkiness surrounding the air-dried pit or fissure. Current radiographic methods cannot detect enamel caries in pits and fissures until the lesion has reached the dentin. Sealants can be safely placed on enamel lesions without jeopardizing the health of the tooth (16-19).

Dentin Caries

Usually the progression of the lesion into the dentin results in the collapse of at least part of the overlying enamel, producing a readily identifiable clinical cavity. Recent studies report lesion progression into the dentin under apparently intact surface enamel, thus making it more difficult to detect lesions in dentin by clinical means (54,55). The visual clues to the presence of a dentin lesion include changes in color, opacity or translucency of the tooth (37). Radiographs show radiolucency beyond the dentino-enamel junction. A pit or fissure surface with definite caries involving dentin should have the caries removed and restored conservatively. This treatment may include the use of sealants, in conjunction with composite restorative materials, and preventive resin restorations (46-53).

Evaluation of Sealants

Reported complete sealant retention after 10 years ranges from 41 to 57 percent (56). Failure of a sealant to be retained on a tooth surface primarily is related to operator technique, specifically moisture contamination at a critical point during the sealant application process. Because most sealant failure occurs relatively soon after application, sealants should be evaluated clinically within one year of placement (20).

Summary of the above discussion can be found in Figure 1. A reprint from the Journal of the American Dental Association regarding a summary of sealant use can be found in Figure 2.

Figure 2

Intervention: Pit and Fissure Sealants
(adapted from JADA, Vol. 126, June 1995; 17-S)

Indications:	<p>Caries risk, regardless of the age of the patient, should be a major criterion for selecting teeth for sealant application.</p> <p>Patients who are at moderate or high risk for developing caries and have pits and fissures that have morphological characteristics further increasing caries risk are candidates for <i>preventive</i> sealants.</p> <p>Patients having incipient caries (limited to enamel) of pits and fissures are candidates for <i>therapeutic</i> sealants.</p> <p><i>[Note: Post-eruptive age alone should not be a major criterion for sealant application. Although the majority of sealants have been placed in children, recent studies suggest that the risk for pit and fissure caries extends beyond adolescence.]</i></p>
Advantages:	<p>Sealants are minimally invasive and require no patient compliance after application. Sealants can be applied by auxiliary personnel. Long-term sealant retention rates are high; fully retained sealants are 100 percent effective and have been shown to arrest caries processes.</p>
Limitations:	<p>Adequate isolation and correct application technique are essential for sealant success. Sealant success is positively associated with eruption status of teeth. The greater the erupted a tooth is, the greater the ability to maintain a dry field. When a tooth is not fully erupted, therefore, sealant placement should be delayed until the tooth is sufficiently erupted. Susceptible pits and fissures to be isolated.</p>
Considerations:	
 Tooth:	<p>Sealants are very useful as a conservative therapy for any tooth with pits and fissures that have questionable carious lesions or caries limited to the enamel. Permanent molars are at the greatest risk for pit and fissure caries and, therefore, the most logical teeth to seal with sealants. Primary molars, premolars and permanent maxillary incisors also may be sealed preventively. Teeth with well-coalesced pits and fissures that are thoroughly cleaned grooves usually do not require sealing.</p>
 Patient:	<p>Cost-effectiveness of sealant use will be maximized by selecting those patients who are at risk for pit and fissure caries. Patient reliability may be a factor in deciding whether or not to wait for further eruption before placing a sealant. When a patient's cooperation, therefore, may be sacrificed in order to assure that sealants are placed on teeth of a patient who does not have regular dental visits.</p>
Reference:	<p>Workshop on guidelines for sealant use, recommendations. J Public Health Dent (in press).</p> <p>Ripa LW. Sealants revisited: an update of the effectiveness of pit-and-fissure sealants. Caries Res 1993;27(Supplement 1):77-82</p>
Resources:	<p>The ADA Council on Access, Prevention, and Interprofessional Relations has developed an information packet.</p>

Sealant Use in Community Programs

The Indian Health Service has used community sealant programs, most notably school-based or school-linked, with great success in the past two decades. Designing a successful community-based program involves careful planning in order to maximize available resources. Below are some guidelines to help in the decision-making process.

Because several direct service sealant program models have operated successfully over the years, the guidelines offer flexibility for designing such programs. Community goals and other considerations will influence the path chosen. Program objectives should be established in advance of program design decisions. For example, one community may choose to offer sealants to the greatest number of people, while another may target specific population groups (e.g., low income). Dental disease patterns continue to evolve, as do the programs designed to meet community needs. Therefore, ongoing monitoring and evaluation of program operations and design are important.

Developing a Community Strategy for Sealant Use

1. Defining the Community

First, the community to be served must be defined. For these guidelines the term “community” is broadly defined as any group with shared characteristics. For example, the community can be one or more municipalities, neighborhoods, school systems, managed care organization memberships, or other populations. In some instances, a state’s population may meet the definition of a community.

2. Assessing Community Need for Dental Sealants

Once the community has been defined, the next step is to assess the need for a sealant program. Verification of need (e.g. prevalence of untreated pit and fissure caries and filled occlusal surfaces, level of control of proximal caries, sealant prevalence) may come from a variety of sources. It may be the result of an epidemiologic survey or may be determined informally from observations reported by teachers, school nurses, or dental clinic staff. If direct assessment of the caries level is not possible, proxy measures for selecting populations with high caries risk may be used (e.g. low income). However assessed, the community need for sealants should help to determine the approach(es) for addressing the problem.

3. Weighing Support and Constraints for Sealant Program Development

Once need has been established, a decision on how to increase sealant prevalence requires consideration of support for program development and constraints that could interfere. Support and constraints may be as general as the value that the community places on oral health or as specific as the availability of people to work on the project and funding for implementation. By identifying support and constraints early, a rational approach can be selected. For example, if a state's dental practice act does not permit dental hygienists or assistants to apply sealants without an on-site dentist, it will be much more costly to operate a direct service sealant program in terms of lost clinic time.

4. Selecting Approaches for Increasing Sealant Prevalence

Given a community's needs, support and constraints, decisions must be made on the necessity and practicality of a sealant program. If there is sufficient need and the balance of support and constraints tips toward the ability to initiate a program, selecting one or more of several approaches for increasing sealant use is the next step.

Direct service programs, in which sealants are applied to individuals' teeth, traditionally have operated in school settings. Transporting a mobile dental clinic and setting up portable dental equipment at schools are common program models. Sometimes, children are enrolled and screened at school but receive sealants at an off-site dental clinic. Other potential sites are institutions (e.g., correctional, residential programs for people with developmental disabilities), military installations, and where needs assessments have shown primary molars of young children to be appropriate targets for sealants, e.g., Head Start programs.

5. Defining Specific Population(s)

Specific populations to receive sealants may be targeted further, or "modified," by a variety of factors to reach those in greatest need. Some degree of targeting probably will be unavoidable unless resources are unlimited. Traditionally, sealant programs have been for schoolchildren, but other special populations may be candidates as well.

School-based or school-linked programs usually operate in second and sixth grades, as suggested in *"Preventing Pit and Fissure Caries: A Guide to Sealant Use"* (local observation of tooth eruption patterns might dictate different grades to be targeted). Often, the programs re-examine the children the next school year to place sealants on newly erupted teeth and tooth surfaces, and to replace missing sealants. Although re-examination may reduce the time available to see new children, it is very important for quality assurance and program evaluation. Other grades may be selected to coincide with program objectives or school considerations (e.g., whether sixth grades are in elementary or middle schools). Selection of higher grade levels usually represents a trade-off

between identifying a greater number of sufficiently erupted teeth and diminishing participation by older students.

6. Identifying Individuals to be Evaluated for Sealants

Once a specific population has been selected, including any modifiers to further target the program, a decision must be made whether to offer the program to all or selected individuals. Often the decision is based upon program policy, e.g., whether IHS dentists in a locale can treat non-Indian schoolchildren and if treatment can be rendered to non-Indians, and whether insurance or other third-party payers will be involved. A very important point is that **participation in a community sealant program is contingent upon consent of a parent or guardian in accordance with local standards.**

7. Identifying Teeth and Surfaces to Seal

Not all individuals within a population are equally appropriate candidates for dental sealants. There are dental conditions that either place them at very low caries risk (e.g., no past caries history combined with well-coalesced pits and grooves) or preclude sealant use (e.g., large proximal caries or restorations on all teeth with fissured surfaces). The individual care guidelines for sealant use (Figure 1) are the basis for tooth selection in targeted community programs. However, since community programs generally lack both the continuity of care and comprehensive array of caries diagnostic and treatment options, those guidelines have been adapted for community programs.

While current models for identifying individuals who are at high risk for dental caries require further development, knowledge about surface-specific caries attack rates and the relationship of tooth eruption to age can help in the design of a program that conserves limited resources and maximizes effectiveness (28, 57). Studies suggest that first and second permanent molars are at greatest risk for pit and fissure caries and that primary molars, premolars and permanent maxillary incisors are at much lower risk (20, 21, 28-30) (local observations might suggest differently). Figure 3 lists the likelihood of the occlusal surfaces of first and second permanent molars being erupted suitably for sealant application at different grade levels (58). While occlusal surfaces are the first to be suitably erupted for sealant application, buccal pits of lower molars and lingual grooves of upper molars also are at substantial

Figure 3

**Availability for Sealant Application of Occlusal Surfaces of
First and Second Permanent Molar Teeth,
According to Grade Level, Ohio 1987-88**

Percentage of Students with All Four Occlusal Surfaces Sufficiently Erupted for Sealant Application and with No Occlusal Surfaces Sufficiently Erupted.

Grade Level	First Permanent Molars		Second Permanent Molars	
	All Four	None	All Four	None
1.00	57.2 %	18.8%	—	—
2.00	88.5%	1.8%	—	—
3.00	96.8%	0.0%	—	—
6.00	—	—	23.6%	—
7.00	—	—	55.5%	—
8.00	—	—	75.8%	—

*"Sufficiently erupted" means that the occlusal surface was completely exposed above the gingival tissue. This does not indicate eruption status of buccal and lingual surface fissures, which can contribute to overall caries levels.

risk for caries and should be sealed when they meet sealant criteria, including the requirement to maintain a dry operating field. It is possible to delay sealant application for these surfaces until a child is seen during the next school year, on follow-up.

Unlike the model for tooth and tooth surface selection in individual care programs, risk assessment of individuals in community sealant programs should give considerable weight to the likelihood of the individual receiving future dental care. This factor can be assessed by observing the presence of caries and restorations or by a questionnaire. It is possible, therefore, that sealants will be applied to a greater proportion of sound teeth and teeth with questionable caries in community programs than in individual care programs because of the inability to monitor teeth over time in the former and a consequent need to “err on the safe side.”

Risk Assessment in Community Programs

Another adaptation of the individual care model is the proposed use of *interim* sealants in community programs for some teeth judged to have dentin caries. An interim sealant is one placed over suspected dentin caries when definitive diagnostic and restorative care are not expected to occur in the near future. Use of interim sealants for caries control is similar to the decades-old use of Intermediary Restorative Material (IRM). The use of interim sealants includes notification of the patient and parent/guardian of the need for restorative care. Interim sealants are recommended only in instances where the examining dentist in a community sealant program believes that the patient is unlikely to complete a restorative care referral in the near future and the size of the carious lesion(s) is not too large to preclude the procedure. Interim sealants are intended to arrest dentin caries until the tooth or teeth can be evaluated and more appropriately treated. The procedure is justified in community sealant programs as a result of studies in which frankly carious teeth were sealed successfully for many years (59-62).

Interim Sealants

Evaluation

Community needs, caries patterns, and dental technology are all dynamic factors that could affect the appropriateness of a sealant strategy over time. Just as communities should assess needs before embarking on a sealant strategy, they also should re-evaluate those needs periodically, along with the effectiveness of the programs they have developed. Likewise, sealant programs should undergo periodic evaluation to determine whether they are meeting their goals efficiently.

Evaluation should focus on the need for sealants, program quality and costs, and the extent to which established programs are meeting the sealant needs of the community. An established program can document sealant need with programmatic data. For example, participation rates in a direct service sealant program may reflect a community's expressed interest in sealants. The number of children found by the program to be lacking sealants and at sufficient risk for pit and fissure caries to require sealant application indicates unmet need. Another evaluation component should be the assessment of

program quality. For example, data on retention rates of sealants placed, comparison of program practices with established standards for infection control, and sealant application technique may be used to evaluate programs. A re-examination component will provide the opportunity for determining sealant retention rates. Program efficiency can be measured in terms of cost per individual, per tooth sealed, or per number of carious lesions prevented.

Recommendations

In light of the current research, the IHS Dental Program should consider the placement of pit and fissure sealants under the following conditions:

1. Seal only teeth sufficiently erupted to establish a good seal.
2. In the school setting, seal pits and fissures of permanent molars, premolars, and maxillary incisors. Seal second primary molars if groove morphology dictates and life expectancy of the tooth is long.
3. In the office setting, seal any newly-erupted primary or permanent molars.
4. Ensure that personnel applying sealants are well trained and fastidious in clinical technique in order to attain adequate retention of sealants on tooth surfaces.
5. Do not attempt to seal teeth with shallow, well-coalesced fissures.
6. Evaluate status of sealants yearly in school settings for at least one year following application. Evaluate every six months, if possible, in office settings. Replace if sealant is totally or partially lost to maximize caries-preventive effects.

Sealant Technique

This section is taken from the manuscript “Seal America: The Prevention Invention” (Draft, August 1994)

The technique used to apply sealants will vary depending upon the staffing of the program and the type of sealant material used. The setting time of self-cure sealants is affected by room temperature. Under ideal conditions, a half-mouth of sealants (four to eight) can be applied from one mix of sealant material with all the sealants curing in approximately one minute. Cooler temperatures slow the curing time and warmer temperatures accelerate it.

While the setting time of light-cured sealants can be more easily controlled, each tooth has to be cured individually, which takes a considerable amount of time. Although the longer time may not seem significant, when the additional curing time per tooth is multiplied by the number of teeth sealed each day, the additional time can make the difference of whether or not a school will require an extra day for completion. Additionally, curing lights add equipment costs and place an additional burden on the electrical systems in the schools.

Technique also varies depending upon the type of isolation used. Cotton rolls with and without cotton roll holders and dry angles are usually used. While cotton roll holders may seem cumbersome at first, after providers get accustomed to using them, they find it easier to maintain a dry environment. The recommended procedure for applying sealants is as follows:

Step 1: Thoroughly Cleaning the Teeth Which Will Be Sealed

Traditionally, teeth have been cleaned with a mounted prophylaxis brush and pumice slurry. However, infection control practices dictate sterilization of handpieces, adding time and cost to a program. Many sealant programs have recently achieved satisfactory one-year retention rates using a dry toothbrush to clean the teeth. The children are asked to brush and the provider checks the teeth for cleanliness and rebrushes to ensure that all debris has been removed. The teeth are thoroughly rinsed before they are isolated.

Step 2: Isolation and Drying

The patient should be positioned so that the treatment site is visible and accessible. The patient's head can be tilted so that saliva pools on the opposite side of the mouth from the teeth being sealed. A high-volume evacuator should be used. Cotton rolls or cotton roll holders and dry angles should be positioned as desired. Dry angles are most effective if placed over the parotid duct opening. Some providers like to place a dry angle between

the cotton roll holder and lingual surface of mandibular teeth to create an additional barrier for the tongue. The teeth should be thoroughly dried.

Step 3: Acid Etching

The cleaned and dried surfaces are etched with phosphoric acid for 20 seconds. Liquid etch flows more easily into grooves and fissures and is preferable to gel type etchants. A small cotton pellet, minisponge, or brush can be used to apply the acid.

Step 4: Rinsing

After 20 seconds, the etch is thoroughly rinsed. It is critical that saliva not come in contact with the prepared tooth surfaces during this step. The dry angles and cotton rolls may need to be replaced. Excess moisture can also be removed with the high-speed evacuator. Upon drying, a properly etched surface will have a dull matte or frosty appearance in contrast to the glossy appearance of unetched enamel. Should salivary contamination occur after this point, the surface must be washed, dried, re-etched for 10 seconds, and washed and dried again before proceeding to the sealant application step.

Step 5: Sealant Placement

Since the application steps will vary according to the product selected, the operator should follow the manufacturer's instructions. When a self-cured material is used, the liquid catalyst and base are mixed in a 1:1 ratio. The patient's head should be positioned so the occlusal plane is parallel to the floor so the sealant does not flow distally before it cures, leaving the mesial pits underfilled. Using the applicator provided by the manufacturer, the mixed sealant is flowed over the etched, dried surface. A technique that has also been reported to have success is to use a dycal placement instrument to guide the sealant into grooves and fissures. The sealant should extend from cusp to cusp, but should not cover the marginal ridges. If more than one tooth in a quadrant is being sealed, the most posterior tooth should be treated first, since maintaining dryness is more difficult in the back of the mouth.

Light-cured sealants do not require mixing. The sealant is applied to the teeth using the applicator provided. Some sealant brands may be applied directly from the bottle to the prepared surface with a disposable cannula. After the sealant has been placed, it is cured with the appropriated light source. Each tooth surface being sealed must be exposed to the curing light for the amount of time indicated by the manufacturer.

Step 6: Sealant Inspection

Isolation of the teeth should be maintained until the sealants are checked visually and with an explorer to make sure coverage of the pits or fissures is complete. If there is a

surface air bubble, more sealant can be applied if the tooth has remained uncontaminated. Otherwise, the tooth must be re-etched for 10 seconds, washed, and dried before adding additional sealant.

A thin surface film of sealant will remain unpolymerized because of contact with air. This film has an unpleasant taste and should be wiped off with a wet cotton roll. The isolation materials can then be removed and the patient allowed to rinse. The patient should be informed that the sealants may feel “high” but will be worn down in the next few days by the patient’s own occlusion.

References

1. McCune RJ, Bojanini J, Abodeely, RA. Effectiveness of a pit fissure sealant in the prevention of caries: Three-year clinical results. *J Am Dent Assoc* 1979;99:619-623.
2. Sheykholeslam Z, Houpt M. Clinical effectiveness of an autopolymerized fissure sealant after two years. *Community Dent Oral Epidemiol* 1978;6(4):181-184.
3. Doyle WA, Brose JA. A five-year study of the longevity of fissure sealants. *J Dent Children* 1978;65(2):23-25.
4. Bagramian RA, Graves RC, Srivastave S. A combined approach to preventing dental caries in school children: Caries reductions after three years. *Community Dent Oral Epidemiol* 1978;6:166-171.
5. Going RE, Haugh LD, Grainer DA, Conti AJ. Four-year clinical evaluation of a pit and fissure sealant. *J Am Dent Assoc* 1977;94:972-981.
6. Cueto EI, Buonocore MG. Sealing of pits and fissures with an adhesive resin. *J Am Dent Assoc* 1967;75:121-128.
7. Bagramian RA, Srivastave S, Graves RC. Pattern of sealant retention in children receiving a combination of caries prevention methods: Three-year results. *J Am Dent Assoc* 1979;98:46-50.
8. Charbeneau GT, Denniston JB. Clinical success and potential failure after a single application of a pit and fissure sealant: A four-year report. *J Am Dent Assoc* 1979;98:559-564.
9. Horowitz HS, Heifetz SB, Poulsen S. Retention and effectiveness of a single application of an adhesive sealant in prevention of occlusal caries: final report after five years of study in Kalispell, Montana.
10. American Dental Association, Council on Dental Health and Health Planning and Council on Dental Materials, Instruments and Equipment. Pit and fissure sealants. *J Am Dent Assoc* 1987;114:671-672.
11. Weintraub JA. The effectiveness of pit and fissure sealants. *J Pub Health Dent* 1989;49(Spec Iss):317-330.

12. National Institutes of Health: Dental Sealants in the Prevention of Tooth Decay. Consensus Development Conference Statement. J Dent Educ 1984;Supplement: 126-131.
13. Ripa LW, Leske GS, Varma AO. Longitudinal study of the caries susceptibility of occlusal and proximal surfaces of first permanent molars. J Pub Health Dent 1988;48:8-13.
14. Foreman FJ. Sealant prevalence and indication in a young military population. J Am Dent Assoc 1994;125:182,184,186.
15. Stahl JW, Katz RV. Occlusal dental caries incidence and implications for sealant programs in a US college student population. J Pub Health Dent 1993;53:212-218.
16. Mertz-Fairhurst EJ, Schuster GS, Fairhurst CW. Arresting caries by sealants: results of a clinical study. J Am Dent Assoc 1986;112:194-197.
17. Handelman SL. Therapeutic use of sealants for incipient or early carious lesions in children and young adults. Proc Finn Dent Soc 1991;87:463-475.
18. Handelman SL, Leverett DH, Iker IP. Longitudinal radiographic evaluation of the progress of caries under sealants. J Pedod 1985;9:119-126.
19. Swift EJ. The effect of sealants on dental caries: a review. J Am Dent Assoc 1988;116:700-704.
20. Preventing pit and fissure caries: a guide to sealant use. Massachusetts Department of Public Health, Boston, MA. 1986.
21. Söderholm KJM. Reactor paper to "The impact of recent changes in the epidemiology of dental caries on guidelines for the use of dental sealants: clinical perspectives." Presented at the Workshop on Guidelines for Sealant Use, Albany, NY, April 1994.
22. Graves RC, Abernathy JR, Disney JA, Stamm JW, Bohannon HM. University of North Carolina caries risk assessment study III: multiple factors in caries prevalence. J Pub Health Dent 1991;51:134-143.
23. Leverett DH. et al. Caries risk assessment by cross-sectional discrimination model. J Dent Res 1993;72:529-537.

24. Disney JA, Graves RC, Stamm JW, Bohannon HM, Abernathy JR, Zack DD. The University of North Carolina caries risk assessment study: further developments in caries risk prediction. *Community Dent Oral Epidemiol* 1992;20:69-75.
25. Leverett DH, et al. Caries risk assessment in a longitudinal discrimination study. *J Dent Res* 1993;72:538-543.
26. Feigal RJ, Jensen, ME. The cariogenic potential of liquid medications: a concern for the handicapped patient. *Spec Care Dent* 1982;2:20-24.
27. Gift HC. Issues of aging and oral health promotion. *Gerodontology* 1988;4:194-206.
28. Brown LJ, Selwitz RH. The impact of recent changes in the epidemiology of dental caries on guidelines for the use of dental sealants. National Institute of Dental Research. Presented at the Workshop on Guidelines for Sealant Use, Albany, NY, April 1994.
29. Rozier RG. Reactor paper to "The impact of recent changes in the epidemiology of dental caries on guidelines for the use of dental sealants: epidemiologic perspective." Presented at the Workshop on Guidelines for Sealant Use, Albany, NY, April 1994.
30. Li SH, Kingman A, Forthofer R, Swango P. Comparison of tooth surface-specific dental caries attack patterns in US school children from two national surveys. *J Dent Res* 1993;72:1398-1405.
31. Going RE, Haugh LD, Grainer DA, Conti AJ. Two-year clinical evaluation of a pit and fissure sealant. Part 1: Retention and loss of substance. *J Am Dent Assoc* 1977;94:972-981.
32. Angmar-Mansson B, ten Bosch JJ. Advances in methods for diagnosing coronal caries. A review. *Adv Dent Res* 1993;7:70-79.
33. Wenzel A. New caries diagnostic methods. *J Dent Educ* 1993;57(6):428-432.
34. Pitts NB. Current methods and criteria for caries diagnosis in Europe. *J Dent Educ* 1993;57:409-414.
35. Lussi A. Validity of diagnostic and treatment decisions of fissure caries. *Caries Res* 1991;25:296-303.

36. Lussi A. Comparison of different methods for the diagnosis of fissure caries without cavitation. *Caries Res* 1993;27:409-416.
37. Pitts NB. The diagnosis of dental caries: lingual and occlusal surfaces. *Dent Update* 1991;18:393-396.
38. Kidd EAM, Ricketts DNJ, Pitts NB. Occlusal caries diagnosis: a changing challenge for clinicians and epidemiologists. *J Dent* 1993;21:323-331.
39. Verdonchot EH, Bronkhorst EM, Burgersdijk RCW, K  ng Schaeken MJM, Truin GJ. Performance of some diagnostic systems in examinations for small occlusal caries lesions. *Caries Res* 1992;26:59-64.
40. Longbottom C, Pitts NB. An initial comparison between endoscopic and conventional methods of caries diagnosis. *Quintessence International* 1990;21:531-540.
41. Bder JD, Brown JP. Dilemmas in caries diagnosis. *J Am Dent Assoc* 1993;124:48-50.
42. Burt BA. Cost-effectiveness of sealants in private practice and standards for use in prepaid dental care. *J Am Dent Assoc* 1985;110:103-107.
43. American Dental Association. Pit and fissure sealant (Report). *J Am Dent Assoc* 1987;114:671-672.
44. Ripa LW. The current status of pit and fissure sealants: a review. *Can Dent Assoc J* 1985;5:367-380.
45. Newbrun E. Preventing dental caries: current and prospective strategies. *J Am Dent Assoc* 1992;123:68-73.
46. Maxwell H, Bales DJ, Omnell K. Modern management of dental caries: the cutting edge is not the dental bur. *J Am Dent Assoc* 1993;124:37-44.
47. Dawson AS, Makinson OF. Dental treatment and dental health. Part 1. A review of studies in support of a philosophy of minimum intervention dentistry. *Aust Dent J* 1992;37:26-32.
48. Dawson AS, Makinson OF. Dental treatment and dental health. Part 2. An alternative philosophy and some new treatment modalities in operative dentistry. *Aust Dent J* 1992;37:205-210.

49. McConnachie I. The preventive resin restoration: a conservative alternative. *J Can Dent Assoc* 1992;58:197-200.
50. Roth AG, Conry JP. A retrospective cohort evaluation of preventive resin restorations. *J Can Dent Assoc* 1992;58:223-226.
51. Ripa LW, Wolff MS. Preventive resin restorations: indications, techniques and success. *Quintessence Int* 1992;23:307-315.
52. Stadtler P. A 3-year clinical study of a hybrid composite resin as fissure sealant and as restorative material for class I restorations. *Quintessence Int* 1992;23(11):759-762.
53. Mertz-Fairhurst EJ, Smith CD, Williams JE, Sherrer JD, Mackert JR Jr, Richards EE, Schuster GS, O'Dell NL, Pierce KL, Kovarik RE, Ergle JW. Cariostatic and ultraconservative sealed restorations: six-year results. *Quintessence Int* 1992;23:827-838.
54. Weerheijm KL, van Amerongen WE, Eggink CO. The clinical diagnosis of occlusal caries: a problem. *J Dent Child* 1989;56:196-200.
55. Wenzel A, Larsen MJ, Fejerskov O. Detection of occlusal caries without cavitation by visual inspection, film radiographs, xeroradiographs, and digitized radiographs. *Caries Res* 1991;25:365-371.
56. Ripa LW. Sealants revisited: an update on the effectiveness of pit-and-fissure sealants. *Caries Res* 1993;27(suppl 1):77-82.
57. Siegal MD, Garcia A, Kandray DP, Giljahn LK. Trends in the use of dental sealants by Ohio dentists. In press.
58. Kuthy RA, Ashton JJ. Eruption pattern of permanent molars: implications for school-based dental sealant programs. *J Pub Health Dent* 1989;49:7-14.
59. Mertz-Fairhurst EJ, Schuster GS, Fairhurst CW. Arresting caries by sealants: results of a clinical study. *J Am Dent Assoc* 1986;112:194-197.
60. Leverett DH, Handelman SL, Brenner CM, Iker HP. Use of sealants in the prevention and early treatment of carious lesions: cost analysis. *J Am Dent Assoc* 1983;106:39-42.
61. Handelman SL, Leverett DH, Iker HP. Longitudinal radiographic evaluation of the progress of caries under sealants. *J Pedod* 1985;9(2):119-126.

62. Sterritt GR, Frew RA, Rozier RG. Evaluation of Guamanian dental caries preventive programs after 13 years. *J Pub Health Dent* 1994;54:153-159.

Nutrition and Dental Caries

This section addresses three questions:

1. What is currently known about nutrition and dental caries?
2. How could current knowledge about nutrition and dental caries be inappropriately translated into suggestions that would conflict with other important nutrition recommendations? How can this confusion be avoided?
3. What are some practical suggestions related to nutrition and dental caries that dental staff can share with patients, with caregivers of young patients, and with other health-care professionals?

Several definitions may prove helpful in understanding this section:

Dental caries = tooth decay

Cariogenic foods = foods (including beverages) capable of causing dental caries because they are converted to acid by microorganisms in the mouth

Fermentable carbohydrates = carbohydrates like sugar and starch that bacteria can convert to acid; fermentable carbohydrates are cariogenic

Cariostatic foods = foods that cannot be converted to acid by microorganisms in the mouth

1. What is Known About Nutrition and Dental Caries?

Dental caries can develop when a) cariogenic bacteria are present in the mouth, b) fermentable carbohydrates are present in the mouth, and c) time is sufficient for caries to develop. The bacteria use the fermentable carbohydrate as food, and in doing so, the bacteria produce acid. The strength of the acid increases the *more often* fermentable carbohydrates are eaten and the *longer* they stay in the mouth.

Fermentable Carbohydrates

Sugars are fermentable carbohydrates, so they are cariogenic. Sugars include white and brown sugar, honey, fructose, and syrup. The sugar in fresh and dried fruit and in fruit juice is also a fermentable carbohydrate. Sweet drinks such as soda pop and other foods like candy, which are made from sugar, contain a lot of fermentable carbohydrate. In fact, soda pop is the source of large amounts of sugar in the diets of many Americans, including American Indians and Alaska Natives: Each 12-ounce can of regular soda pop has approximately 10 teaspoons of sugar — that works out to 55 teaspoons per two-liter bottle!

Starch is a fermentable carbohydrate. Flour has a lot of starch, so flour and foods made with flour such as bread, cereal, crackers, tortillas, and pretzels contain fermentable carbohydrates. Foods like potato chips and taco chips also have fermentable carbohydrate because they are made from a starchy vegetable.

Foods made with sugar *and* starch can be cariogenic. Cookies, cake, pie, and doughnuts and other such foods contain a lot of fermentable carbohydrates. These foods also tend to stick to the teeth and stay in the mouth much longer.

Artificial sweeteners are *not* cariogenic. Artificial sweeteners include aspartame and saccharin; brand name products like Equal and Sweet’N Low; and sugar alcohols like mannitol, sorbitol, and xylitol.

Overall Diet

Although much research has examined sugar and starch in the decay process, most of this work has focused on specific foods eaten separately, not on the varying patterns of different foods that people eat over a period of time. *For this reason, specialists in nutrition and oral health recommend that patients first eat a healthy diet overall, and then look at their sugar and starch intake, especially as snacks.* The Food Guide Pyramid (found at the end of this subsection on page IV-102) is a daily guide to food choices for healthy people over two years of age.

Eating habits. Frequent eating of snacks with fermentable carbohydrate increases the risk of dental caries.

Water. Drinking water after meals and snacks can help prevent caries by decreasing the amount of food that sticks to the teeth.

Saliva Production. Some foods stimulate saliva production, which can help prevent caries in two ways: First, saliva decreases the strength of the acid in the mouth. Second, increased saliva makes a person swallow more often. This means that foods (and any acid) are in the mouth a shorter time, so they are less likely to cause caries. Foods with fiber — vegetables, fruits, and whole grains — stimulate saliva production.

Oral hygiene habits. Brushing with a fluoridated toothpaste after eating meals and snacks can greatly reduce the risk of caries. When brushing isn't possible, rinsing the mouth with water or chewing sugarless gum are helpful alternatives.

Fluoride. Fluoride in drinking water and toothpaste can help prevent dental caries. Some fluoride enters the tooth directly through the tooth surface (topical), and some enters the tooth internally from the bloodstream (systemic). The degree to which fluoride's positive effects can be overcome by a poor diet is unknown.

2. How Could Current Knowledge About Nutrition and Dental Caries Be Inappropriately Translated into Suggestions that Would Conflict with Other Important Nutrition Recommendations? How Can This Confusion Be Avoided?

Areas of potential confusion include the following:

Recommendations to Reduce Intake of Starchy Foods

Sugars have long been known to contribute to dental caries. More recent research indicates that starches also contribute to dental caries because, like sugar, starches are fermentable carbohydrates. This new knowledge could be inappropriately used to make recommendations to patients to limit the amount of starch and starchy foods that they eat. Such recommendations would contradict the Food Guide Pyramid, a cornerstone of U.S. public health nutrition policy, which encourages intakes of foods high in starch and other carbohydrates, for example, breads, cereals, fruits, and vegetables.

In fact, the Food Guide Pyramid encourages healthy Americans over two years of age to develop a number of daily eating habits, including the following:

- To consume 6-11 servings of bread, cereal, rice, and pasta
- To consume 5-7 servings of vegetables and fruits
- To limit intake of fat

If health-care staff develop nutrition and dental health recommendations without thinking about nutritional health more broadly, patients could be given confusing and conflicting advice, for example, “Eat *less* bread and cereal products to prevent tooth decay,” and “Eat *more* bread and cereal products to help prevent obesity, heart disease, and certain types of cancer.” *Patients must not be given these types of conflicting guidance.*

Recommendations to Increase High-Fat Snacks

Although some foods, like cheese, are cariostatic, high intake of these items should be discouraged if they contain a high fat content. Intake of these foods should be based on the recommendations of the Food Guide Pyramid. Moderate intake can be part of a healthy diet, but high intake of fatty foods can contribute to conditions such as obesity and heart disease, serious problems among many American Indians and Alaska Natives. *Again, patients must not be confused with conflicting dietary guidance*, such as, “Snack on *high-fat* foods to prevent tooth decay,” and “Snack on *low-fat* foods to prevent overweight and heart disease.”

Recommendations that Children Avoid Snacks

Frequent snacking, particularly when snacks contain a lot of fermentable carbohydrate, increases the risk of dental caries. However, snacks are important in the diets of many young children. This is because most children's stomachs are too small to hold all the food they need to eat at meal times to meet their daily nutritional needs. They need *healthy* snacks between meals.

How to Avoid Potential Confusion:

Overall Diet: Encourage patients to follow the Food Guide Pyramid.

Starchy Foods: Encourage patients of all ages to eat plenty of bread and cereal products, vegetables, and fruits. Encourage them to limit such foods as cookies and cake, which contain sugar and starch. When these foods are consumed, they should be included *with* meals, not as snacks.

Snacks: Encourage adult patients to eat only healthy snacks such as those listed on the following pages. Most of these snack ideas combine a cariogenic food that contains starch or sugar (like bread or fruit) with a cariostatic food (like milk, cheese, or peanut butter) that can lessen the cariogenic effects of the sugar and starch. That is, milk, cheese, or peanut butter in snacks makes them less cariogenic; and vegetable, fruit, or bread in snacks helps reduce their fat and calorie content.

Water: Encourage patients to drink water after meals and snacks to help decrease the amount of food that sticks to their teeth.

Oral Hygiene Habits: Encourage patients to brush with a fluoridated toothpaste after eating meals and snacks. When brushing isn't possible, rinsing the mouth with water or chewing sugarless gum are helpful alternatives.

3. What Are Some Practical Suggestions Related to Nutrition and Dental Health that Dental Staff Can Share with Patients, with Caregivers of Young Patients, and with Other Health-Care Professionals?

Following is a list of suggestions for adults and caregivers of young patients:

Food and Tooth Decay: What Can YOU Do to Prevent Cavities?

Nutrition-Related Suggestions for Adult Patients

- *Eat a healthy diet* by following the Food Guide Pyramid.
- *Avoid soda pop*
 - Drink water to quench thirst.
 - Choose healthier alternatives to soda pop, for example, fruit juice mixed with club soda, Native teas, or mineral water.
 - Be a healthy role model for children in your family and community: Drink less soda pop!
- *Snacks*
 - When you snack, choose healthy snacks like those listed in the box on the second page following.
 - Limit snacks like candy and raisins that have a lot of sugar and stick to teeth.
 - Drink water with snacks.
 - After you snack, brush your teeth, rinse your mouth out with water, or chew some sugarless gum.
- *Artificial sweeteners and preferences for sweet foods*
 - If you chew gum, chew sugarless gum.

- Try to develop preferences for less sweet foods. To do so, limit your intake of artificially sweetened foods. Also, try to eat foods with less added sugar, for example, eat more fruit for dessert.

Nutrition-Related Suggestions for Caregivers of Young Patients

- *Encourage children to eat a healthy diet* by helping them follow the Food Guide Pyramid.
- *Avoid soda pop*
 - Serve children water to quench their thirst.
 - Serve children low-fat regular or chocolate milk instead of soda pop.
 - If children don't drink soda pop, don't start them on it!
 - If children drink soda pop, limit the amount and frequency.
- *Other sweets*
 - Limit the amount of candy, regular gum, and other sweets (like cookies, cake, and doughnuts) that children are offered.
 - When children eat candy and other sweets, try to include these with a meal rather than as snacks.
- *Snacks*
 - Serve children healthy snacks like those listed in the box on the next page.
 - Limit snacks like candy and raisins that have a lot of sugar and stick to teeth.
 - Try to limit snack times to no more than three per day.
 - After children snack, encourage them to brush their teeth, rinse their mouth out with water, or — if they are old enough — to chew some sugarless gum.
- *Artificial sweeteners and preferences for sweet foods*
 - If children chew gum, provide them with sugarless gum.

- Help children develop preferences for less sweet foods. To do so, serve children artificially sweetened foods only occasionally. Also, offer foods with less added sugar, for example, serve fruit more often for dessert.

Healthy Snack Ideas:

Fruits and vegetables cut up and served with low-fat dip
Tortilla with melted cheese*
Low-sugar cereal* with milk*
Cottage cheese with crushed pineapple
Low-fat fruit yogurt
Sliced apple with peanut butter*
Sliced turkey with a glass of orange juice*
Cucumber slices spread with cream cheese
Cheese* and crackers
Graham crackers and chocolate milk

**Items available through the WIC Program*

***Remember that many local traditional foods
may also be healthy snacks!***

Suggestions for Other Health-Care Providers

- Encourage patients and caregivers of young patients to develop positive dental health habits by following the suggestions listed in this section.
- Support local initiatives to fluoridate the community water supply, and to improve the nutritional quality of the local food supply. For example, encourage vendors to supply healthy alternatives in vending machines, encourage schools to provide healthy meals, encourage local grocery stores to offer high-quality fruits and vegetables, etc.
- Encourage routine, periodic visits to the dentist. These visits cannot prevent decay, but they allow for early detection and treatment when decay exists. These visits also give dental staff the opportunity to involve patients in health education and decay prevention activities.

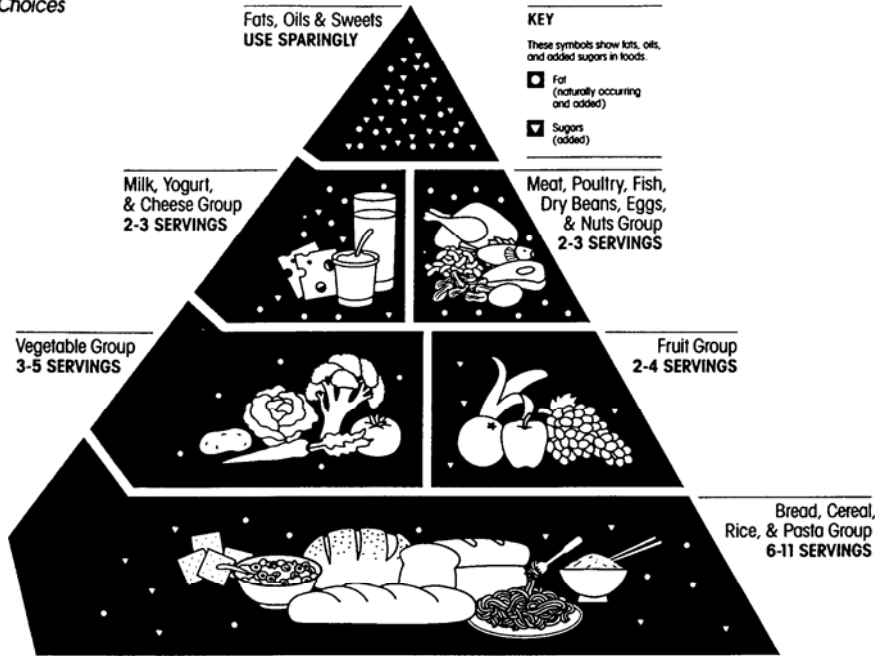
FOOD GUIDE PYRAMID

A Guide to Daily Food Choices

The Food Guide Pyramid emphasizes foods from the five food groups shown in the three lower sections of the Pyramid.

Each of these food groups provides some, but not all, of the nutrients you need. Foods in one group can't replace those in another. No one food group is more important than another—for good health, you need them all.

The Pyramid is an outline of what to eat each day. It's not a rigid prescription, but a general guide that lets you choose a healthful diet that's right for you. The Pyramid calls for eating a variety of foods to get the nutrients you need and at the same time the right amount of calories to maintain a healthy weight.



Source: U.S. DEPARTMENT OF AGRICULTURE and the U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

WHAT COUNTS AS 1 SERVING?

The amount you eat may be more than one serving.

For example, a dinner portion of spaghetti would count as 2 or 3 servings.

BREAD, CEREAL, RICE, & PASTA GROUP	VEGETABLE GROUP	FRUIT GROUP	MILK, YOGURT, & CHEESE GROUP	MEAT, POULTRY, FISH, DRY BEANS, EGGS, & NUTS GROUP	FATS, OILS, & SWEETS
1 slice of bread 1/2 cup of cooked rice or pasta 1/2 cup of cooked cereal 1 ounce of ready-to-eat cereal	1/2 cup of chopped raw or cooked vegetables 1 cup of leafy raw vegetables	1 piece of fruit or melon wedge 3/4 cup of juice 1/2 cup of canned fruit 1/4 cup of dried fruit	1 cup of milk or yogurt 1-1/2 ounces of natural cheese 2 ounces of process cheese	2 to 3 ounces of cooked lean meat, poultry, or fish Count 1/2 cup of cooked beans, or 1 egg, or 2 tablespoons of peanut butter as 1 ounce of lean meat	LIMIT CALORIES FROM THESE especially if you need to lose weight

References

DePaola DP, Faine MP, Vogel RI. Nutrition in relation to dental medicine. In: Modern Nutrition in Health and Disease, 8th ed. Shils ME, Olson JA, Shike M, eds. Philadelphia: Lea & Febiger; 1994: 1007-1028.

Lucas B. Nutrition and the school-age child. In: Nutrition in Infancy and Childhood, 5th ed. Pipes PL, Trahms CM, eds. St. Louis: Mosby; 1993: 142-164.

Touger-Decker R, Mobley C. Position of The American Dietetic Association: Oral health and nutrition. J Am Dietetic Assoc 1996;96: 184-189.

Rugg-Gunn HA. Nutrition and Dental Health. Oxford: Oxford University Press; 1993.

Credits

The nutrition subsection was developed by Suzanne Pelican, MS, RD/LN. IHS Nutrition and Dietetics Training Program (P.O. Box 5558, Santa Fe, NM 87502; 505-988-6470) with input from:

Connie Mobley, Ph.D., R.D.
Associate Professor, Community Dentistry
University of Texas Health Science Center at San Antonio
7703 Floyd Drive
San Antonio, TX 78284-7919

Reva Touger-Decker, Ph.D., R.D.
Assistant Professor
University of Medicine and Dentistry of New Jersey
Department of Oral Pathology
110 Bergen St., Room C-827
University Heights
Newark, NJ 07103-2400

Baby Bottle Tooth Decay/Early Childhood Caries

Baby Bottle Tooth Decay/Early Childhood Caries (BBTD/ECC) presently affects as many as 50 percent of American Indian/Alaska Native children under age five. BBTD is defined as dental decay of varying severity affecting at least two of the four primary maxillary anterior teeth of children under age three years and attributable to improper feeding practices. ECC encompasses a broader etiology with a wider range of interventions, and includes conditions such as rampant caries in posterior primary teeth.

BBTD/ECC and its consequences are causes of major resource expenditures in the IHS Dental Programs. New approaches for the prevention and treatment of BBTD/ECC must take into account the permissive behaviors in families. The prevention of BBTD/ECC must be integrated with other health disciplines such as medical, mental health, and nutritional care in order to have a significant impact, because BBTD/ECC occurs before most young children reach the dental clinic.

Virtually everyone can support initiatives to improve the health status of young children. BBTD/ECC is an important dental health issue around which extensive, strong community-based HP/DP programs can be built.

Primary Prevention

Recommendations for parents and caretakers:

1. Never put a child to bed with a bottle containing anything but water.
2. Do not let a child walk around or sit with a bottle during the day.
3. Teeth should be cleaned daily, beginning when they first erupt.
4. Start a child drinking from a cup no later than one year of age.
5. Encourage parents/caregivers to bring their child to the dental clinic by age 12-18 months for a check-up.

Prevention Activities

The Indian Health Service Dental Program recently revised the educational materials for parents and caregivers. *Stop Dental Decay Among Our Native American Children!* contains information about caring for children's teeth from ages one to five years, focuses

Additional
Resources

on ways that parents/caregivers can take care of their children's teeth, and includes clinical primary intervention recommendations. CDC has also developed a manual entitled, *Preventing BBTD: A Comprehensive Training Program for Community Workers and Health Professionals*.

Dentists in the IHS, as well as private dentists in the community, should encourage parents to bring their children to the clinic at about age one year for a screening exam. This visit also provides an opportunity to discuss oral health care with parents and caregivers.

The following steps will provide assistance in implementing a BBTD/ECC program:

1. Establish Baseline Prevalence of BBTD/ECC in the Community

This measure will provide you with a means to measure your effectiveness and evaluate your program. It will also give you local data to generate support for the program. A community-based sample, such as WIC clinics, Head Start, or day care centers, is preferable to a dental clinic-based sample, because those who receive clinical services may not be a representative sample. On the other hand, if a large percentage of children receive oral exams in a clinical setting, this sample would suffice.

A visual examination is all that is required to determine if there are any carious lesions or restorations on the four maxillary primary anterior teeth. Most of the surveys to date have been conducted in Head Start centers using flashlights or overhead light where adequate. Only mirrors were generally used and there were no radiographs used.

To determine prevalence, count the total number of children screened and divide this number into the number of children with BBTD. BBTD is defined as two decayed, extracted, or restored teeth of the four maxillary anterior teeth. The resulting figure is the prevalence of BBTD in your community. To evaluate program effectiveness, examine the same-age children in the same setting in three to five years and compare your findings.

2. Select a Site Coordinator

Each potential site should select a suitable site coordinator, keeping in mind the central role and contribution that this person can make to the success of a BBTD/ECC program. Characteristics of effective coordinators include enthusiasm, commitment, ability to motivate other people, and credibility among both the lay community and the health professionals. Each site also should consider obtaining training for the site coordinator from Indian Health Service to assure an acceptable level of knowledge about implementation of the program and to obtain technical assistance for the transfer of the program.

Selection Criteria

3. Obtain Support Contracts

You will need to contact several key persons in your community to get their support and cooperation. The best way to do this is to contact them on an individual basis. Written agreements of support for implementation of the BBTD/ECC program from local political and health agencies are recommended. These agreements are not legally binding, but document a commitment within the political structure of the community. They are often used to inform the community about the benefits of the program.

4. Assemble a Task Force

The task force should be composed of policy-makers, parents, health workers, and other people who have the potential to make a substantial contribution to the program. The role of the task force is to “customize” the BBTD/ECC program to the community, report on activities, plan future strategies, and evaluate the program’s success. The task force meets three to four times a year (more often during the early design stages of the program). Head Start, WIC, day care providers, and other local groups should be encouraged to participate.

5. Design a Program Plan

The program plan should be customized to the community and encourage the ongoing development of strategies and education materials tailored to the population. A budget should be developed as part of your program plan. The development of a program plan is largely a function of the task force.

6. Develop an Evaluation Plan

The plan will be used primarily to monitor the success of the program within the community. An evaluation plan should include measurement of BBTD/ECC prevalence and surveys of knowledge, attitudes, and behaviors of the caretakers of young children.

Risk-Based Periodontal Disease Prevention and Treatment

Background

Risk Differences Within Populations

The effective treatment of periodontal disease in a public health setting has always been challenging. Recent advances in the understanding of periodontal diseases are offering new opportunities for prevention and treatment using a public health approach. Natural history studies have revealed the presence of individual periodontal risk differences within populations. Individuals with similar levels of periodontal risk can be placed in subgroups. Subgroups with high periodontal risk generally involve a relatively small percentage of the total population. Moderate-risk subgroups are quite large, accounting for the majority of any population. Factors that increase the risk of periodontal breakdown are now well known. Individuals who suffer from diabetes, immune suppression diseases, and certain blood dyscrasias are all at high risk for periodontal disease. More recently, smoking has been found to be a powerful factor for increasing the risk of periodontal disease. Finally, some individuals may fall into the high-risk category simply because they inherit an immune system that is less than efficient in managing the periodontal disease pathogens or the inflammatory processes these bacteria produce.

Scaling and Root Planning (S/RP)

A better understanding of the effects of so called “scaling and root planing” (S/RP) has occurred in recent years. Many synonymous, and perhaps confusing, terms are used today to describe the S/RP activity. Some clinicians refer to S/RP as deep scaling, pocket debridement, cavitroning, or ultrasonic cleaning. However, probably the best description is root debridement. Regardless of its name, the process of removing all soft and hard debris from the root surfaces, even if it is done without perfection, results in greatly enhanced periodontal health. Removing or even disturbing subgingival plaque and calculus deposits causes a dynamic interactive process that involves bacterial recolonization, activation of the immune system (particularly specific circulating antibodies), and initiation of wound healing. Over time, if oral hygiene practices are inadequate, bacterial changes may occur in the subgingival plaque, which leads to chronic inflammation of the gingival tissue and possible attachment loss. The length of time necessary for this conversion from a healthy periodontal pocket to a chronically inflamed one varies from individual to individual. However, it is generally accepted that periodontal health can be maintained when S/RP is conducted at three-month intervals.

In addition to the recognition of periodontal risk groups and the acknowledgment that non-surgical therapy can maintain periodontal health, new chemotherapeutic agents have been developed as adjuncts to periodontal treatment. The subgingival irrigation of anti-infective agents and locally delivered antibiotics will improve the success of the initial

S/RP and prolong the period of gingival health between cleaning sessions. Preliminary studies suggest that locally-delivered forms of antibiotics alone may be as effective as S/RP in reducing subgingival periodontal disease-causing bacteria. A first generation, non-resorbable tetracycline-laden fiber is now available. In the near future, second and third generation resorbable antibiotic carriers will be approved for general use. The availability of chemotherapeutic adjuncts to traditional non-surgical therapy offers new opportunities for the successful management of periodontal disease. Moreover, technological advances in magnetostrictive and piezoelectric ultrasonic cleaners are revolutionizing traditional hand scaling techniques. New instruments make it possible to combine ultrasonic cleaning (S/RP) with anti-infective subgingival irrigation. It is easy to envision a treatment approach in the near future that utilizes subgingival ultrasonic debridement combined with anti-infective irrigation, followed by the placement of resorbable locally-delivered antibiotics. Through the use of these new technologies, recall intervals for even high-risk individuals may be extended for prolonged periods of time.

Purpose

The purpose of this clinic manual is to describe diagnosis and treatment methods which combine population-based periodontal disease risk assessments with current treatment technologies. The methods described in this manual prioritize care delivered to a population by targeting individuals with the highest risk for periodontal breakdown. High-risk individuals will receive the most intensive therapy and follow-up. Care will be provided to moderate-risk or advanced disease individuals based on the resources available to the treating staff and facility. *Note: The system of prioritized periodontal treatment delivery described in this manual assumes that all dental staffs are capable of providing the treatment needs associated with CPITN scores of 0 through 3 for all patients receiving examinations in their clinics.*

Targeting

I. Early Disease Assessment and Treatment

A. Periodontal Disease Assessment (CPITN 0 to 3)

At each initial examination appointment (0110) and at least annually, the periodontal status should be assessed. The diagnosis and risk assessment of individuals will be based on the Community Periodontal Index of Treatment Needs (CPITN). The World Health Organization (WHO) probe will be utilized to determine CPITN status. A complete description of the CPITN index and the WHO probe will not be discussed here. However, a brief outline of CPITN scores 0 through 3 and corresponding diagnostic features is shown below:

CPITN SCORES	CLINICAL DESCRIPTION
--------------	----------------------

0	PERIODONTAL HEALTH
1	BLEEDING ON PROBING
2	CALCULUS or RESTORATION OVERHANG PRESENT
3	3.5 – 5.5 mm PROBING DEPTH

In addition to clinical descriptions, the CPITN also provides standard treatment requirements for each score of 0 through 3. Standard treatments exist for these minimal disease scores because the treatment needs are relatively simple. With appropriate treatment and patient home care, CPITN scores of 1, 2, and 3 can be returned to 0 (periodontal health). The following describes the treatment needs associated with CPITN scores of 0 through 3:

Treatment
Needs
CPITN 0-3

CPITN SCORES	TREATMENT NEEDS
0	PROMOTE SELF-ASSESSMENT SKILLS
1	ORAL HYGIENE INSTRUCTIONS (OHI)
2	OHI + ULTRASONIC CLEANING/OVERHANG REMOVAL
3	OHI + ULTRASONIC CLEANING

B. Treatment (CPITN 0 to 3)

Standardized treatment needs have been established for the minimal periodontal disease conditions described by CPITN scores of 0 through 3. These standardized treatments have been found to be helpful guides to dental auxiliaries who often are assigned the task of providing the basic periodontal care associated with low CPITN scores.

1. Self-Assessment — CPITN Score 0

Self-Assessment is a method taught to patients that enables them to determine the status of their own oral health. The self-assessment techniques most commonly used focus on the identification of gingival bleeding as an indicator of the presence of periodontal disease.

2. Oral Hygiene Instructions (OHI) — CPITN Scores >1

Oral hygiene instructions should include individualized patient education with emphasis on plaque and bleeding self-assessment, use of cleaning devices (toothbrushes, proxabrushes, rubber tips, and floss) and in some cases, the home use of chemotherapeutics and irrigators. Motivational methods, such as the use of a microscope, should be encouraged.

The cornerstone of oral hygiene instructions is teaching the proper use of the toothbrush. A sulcular brushing technique, the Modified Bass Technique, is suggested as the standard for OHI.

Standard
Toothbrushing
Technique

Once toothbrushing competence has been achieved, techniques for interproximal cleaning can then be taught. The use of rubber tips and proxabrushes (where possible) should be emphasized. The mastery of dental flossing is difficult and, therefore, should be reserved for motivated patients.

3. Ultrasonic Cleaning — CPITN Scores 2 to 3

In recent years, research has lead to a great improvement in the understanding of the biological effects of traditional scaling and root planing (S/RP). Due to this greater knowledge, a revolution has occurred in the approach, methods, and instrumentation used in non-surgical periodontal therapy. Studies have demonstrated that root surfaces do not need to be meticulously scraped or planed to remove “infected cementum and dentin.” *The goal of periodontal root debridement currently is to simply remove all hard and soft debris from the roots.* This task can be most easily accomplished through the use of ultrasonic instruments. Dental researchers have compared traditional hand instrumentation with sonic and ultrasonic instruments. The conclusion is that both instruments produce similar results with regard to crown and root debridement and improvements in the health of periodontal tissues. However, it is generally conceded that sonic and ultrasonic instruments are faster and easier to use than hand instruments. Further, technologic advances have greatly reduced the size of many ultrasonic tips, which are now capable of functioning in deep pockets and able to reach into small defects or irregularities that a hand instrument cannot reach.

Hand Instruments
versus Sonic/
Ultrasonic

For our purposes, only two ultrasonic instruments will be used. The most common is the Dently Cavitron. This is a magnetostrictive instrument. The magnetostrictive principle on which this instrument operates produces a characteristic elliptical motion in the Cavitron tip. This has an advantage in that the instrument tip is active on all sides. The disadvantages of the Cavitron include its inability to use anti-infective agents, its need to be operated for approximately two minutes prior to each use (in order to flush the system), and its lack of portability.

Cavitron

The Electro Medical Systems (EMS)/Biotrol Piezon Master is the other type of ultrasonic instrument that may be available. This instrument operates piezoelectrically. Piezoelectric instruments move the working tip in a reciprocal (back-and-forth) motion. Therefore, only two sides of the Piezon Master’s tip are generally used during operation. The Piezon Master has the ability to utilize any anti-infective agent as a lavage during its use.

II. Advanced Disease: Risk Assessment and Treatment

A. Risk Assessment (CPITN ≥4 or Deep Pockets)

Age-Based and
Severity-Based

Once CPITN scores reach or exceed 4 (pocket depths ≥6 mm), it is certain that periodontal attachment loss has occurred. Pocket depths of 6 mm or greater are generally considered to be deep pockets. Deep pockets suggest advanced or advancing disease. Generally the severity of periodontal disease is related to the length of exposure to oral bacteria. For periodontal disease, exposure for each adult tooth begins at the time of eruption. Natural history and epidemiologic studies have shown that, for most people, several decades of exposure are required to produce deep pockets. However, for a small percentage of any given population, deep pockets occur with relatively few years of exposure. The World Health Organization has reported, from surveys conducted on many populations, 10-15% of 15 year olds are already demonstrating signs of alveolar bone loss. A National Institute of Dental Research (NIDR) study carried out on the Navajo Reservation in 1985, revealed 16.1% of Navajo adolescents (14-16 years of age) suffered from ≥4mm of radiographic bone loss. Given this evidence of increased susceptibility to the periodontal disease process in some individuals, an assessment system was developed which includes *both disease severity and age* to establish risk for disease. A model for risk assessment, using CPITN and age, is presented below:

Treatment
Needs
CPITN 0-3

POPULATION PERIODONTAL TREATMENT NEEDS USING CPITN			
CPITN SCORES	TREATMENT NEEDS		
0	ORAL HYGIENE INSTRUCTIONS (OHI)		
1	OHI		
2	OHI AND PROPHY		
3	OHI AND PROPHY		
≥4 Deep Pockets	AGE DETERMINES RISK CATEGORY		
	14 – 35 YEARS HIGH RISK OHI High Intensity, Non-Surgical Chemotherapy Active Recall	36 – 59 YEARS MODERATE RISK OHI Closed or Open Root Debridement Optional Recall	≥60 YEARS LOW RISK OHI Closed Root Debridement Optional Recall

Dental managers who wish to address the advanced periodontal disease in their treatment population can utilize this model to target high-, moderate-, and low-risk groups for care. Once individuals are assessed and assigned to a risk category, they remain in the designated category for life. For example, a high-risk individual will always be at high-risk for periodontal disease. Several advantages are provided by using this model. First, patients at high-risk can be prioritized for treatment. *Young individuals with advanced disease are at the highest risk for tooth loss and therefore should be given the highest priority for treatment.* Another important advantage this model affords is that dental managers, considering their resources, i.e., facility and staff size, can rationally control the access of advanced disease patients to their clinic(s).

1. High-Risk Patients

POPULATION PERIODONTAL TREATMENT NEEDS USING CPITN		
CPITN SCORES	TREATMENT NEEDS	
0	ORAL HYGIENE INSTRUCTIONS (OHI)	
1	OHI	
2	OHI AND PROPHY	
3	OHI AND PROPHY	
≥4	AGE DETERMINES RISK CATEGORY	
Deep Pockets	14 – 35 YEARS HIGH RISK	
	OHI High Intensity, Non-Surgical Chemotherapy Active Recall	

Treatment
Needs
CPITN 4

a. Assessment of High-Risk Patients

Age and severity parameters for high-risk individuals were established using available epidemiologic studies and the American Academy of Periodontology's definition of Early Onset Diseases (EOD). Therefore, any individual 14-35 years of age with one or more site of CPITN scores of 4 would be determined to be at high-risk for periodontal disease. The high-risk assessment criterion is designed to identify attachment or bone loss on individuals within the 14-35 age range.

Note: It is possible that people who are older than 35 years of age can also be categorized as high-risk. Episodic dental users with EOD may not have received a dental examination until after age 35. At 36-45 years of age for example, high-risk individuals,

who have not received routine treatment, would be expected to have generalized advanced bone loss and perhaps some missing teeth. Likewise, older individuals (age 36-45 years) who suffer from rapid bone loss, such as uncontrolled diabetics, should also be included as high-risk. Untreated high-risk people will lose many of their teeth in the third and fourth decade of life.

b. Oral Hygiene Instructions for High-Risk Patients

Although oral hygiene instructions are an essential element of overall periodontal treatment, positive oral hygiene behavior changes often do not result. However, if the intent of this risk-based periodontal disease treatment approach is to prioritize care for those who need it most (high-risk individuals), then it makes sense to offer the best and most intense therapy possible. This also applies to oral hygiene instructions. For high-risk individuals, a high-intensity oral hygiene program should be provided.

Patient Revisits: An evaluation of the patient's oral home care is essential at each dental visit. Based on this evaluation, the high-intensity oral hygiene program may have to be repeated. However, as the patient becomes aware of the information provided and oral hygiene improves, many of the steps above may be skipped at the recall visit.

c. Treatment for High-Risk Patients

Treatment should be based on a high-intensity, nonsurgical approach. Emphasis should be placed on the use of ultrasonic rather than hand instruments. Frequent, periodic root debridements should be the goal. *Local anesthetics will frequently be required for the adequate cleaning of deep pockets (CPITN 4) with ultrasonic instruments.* The use of local anesthetics may not be required for subsequent recall cleaning visits if root surfaces are relatively free of deposits.

Root Debridement Procedure: Cleaning all root surfaces is the most important aspect of nonsurgical periodontal therapy. Removing plaque and calculus from subgingival areas has challenged dental providers since plaque was determined to cause gum disease, over one hundred years ago. Dental researchers in the last three decades have repeatedly documented the difficulty of removing soft and hard debris from root surfaces that are irregularly shaped and cannot be visualized. The effectiveness of hand instrumentation during root debridement decreases progressively with increasing pocket depths. Maintaining sharp curettes, obtaining secure finger rests, activating the appropriate instruments at the correct angles, and cleaning all root surfaces are some of the major obstacles that must be overcome in traditional hand root planing. Obviously, the success of hand instrumentation is determined largely by the skill level of the operator. In order to provide hand-instrumented periodontal services to a large population, it is necessary to have many highly-skilled providers. This requirement is not achievable for most publicly-funded programs.

Ultrasonic Instrument Advantages

Fortunately, technology has produced and constantly improved the sonic and ultrasonic instruments. With advances in these instruments and our current understanding of root debridement, ultrasonic machines can virtually replace hand instruments. Ultrasonic instruments offer many advantages over hand instruments. Most importantly, they require less skill to master, they require less time to effectively debride roots, and they produce less hand fatigue for the operator. Training in the ultrasonic method of root debridement is definitely required, but much less practice time is needed to master the skill.

Technique: For high-risk patients, the use of ultrasonic instruments is recommended. *Frequently, local anesthetic is required for initial subgingival cleaning procedures.* However, subsequent recall procedures, which do not include heavy calculus removal, can usually be accomplished without local anesthetic. The working tip of the ultrasonic instrument should be applied to the tooth surface in small circular motions. The debridement process should begin at the coronal aspect of the tooth, moving gradually to the most apical area of the pocket. Care must be taken to assure that all crown and root surfaces of each tooth are touched by the instrument tip. The instrument tip must always remain in motion and in contact with the tooth surface. Very little force should be applied to the instrument. It is also important that the instrument tip of any sonic or ultrasonic instrument never be directed “end-on” to the tooth surface. Following the initial use of the ultrasonic instrument during the procedure, the operator should carefully re-examine all crowns and roots with a periodontal probe or other suitable instrument to assure that the surfaces are free of hard and soft debris. Any remaining deposits can be removed with either the ultrasonic instrument or hand instruments.

Anti-Infective Agents: Anti-infective agents should be used extensively. Many of the agents listed below have been used for decades to clean and disinfect skin and mucosal wounds. Irrigating or lavaging anti-infective agents into the most apical aspects of periodontal pockets helps to eliminate the resistant anaerobic organisms. Therefore, utilizing anti-infective agents serves as an adjunct to the cleaning process by improving the healing response and delaying bacterial recolonization of the periodontal pockets. These agents can be employed in conjunction with the coolant spray of certain ultrasonic instruments or as a separate subgingival irrigation procedure following the ultrasonic cleaning. It appears that the exposure time of the anti-infective agents to the subgingival bacteria is critical for the success of the procedure. *Studies have demonstrated a minimum of 5-10 minutes of constant lavage or exposure is required to produce the desired effect.* When an anti-infective agent is used with the ultrasonic instrument, the minimum exposure time is automatically achieved. However, when hand irrigation is conducted as a separate procedure, care must be taken to provide the necessary minimum exposure time. The chemotherapeutic agents currently recommended include 5-10% povidone iodine, a combination of 5% povidone iodine + 1.5% hydrogen peroxide (Perimed) or 0.12% chlorhexidine (Peridex). *(Note: A cost analysis [Perrypoint 1994] reveals that 16 oz of 10% povidone iodine costs \$1.21 while 16 oz of Peridex is \$7.36. The 10% iodine*

can be diluted with water to make a 5% solution and still be effective. This results in a cost for iodine that is less than 1/10 that of Peridex.) The 5% povidone iodine and 5% iodine and 1.5% hydrogen peroxide mix are the agents recommended for routine use. *However, when using these agents delivered through an ultrasonic machine, it is recommended that hydrogen peroxide not be used as an irrigating agent. The intense foaming caused by the hydrogen peroxide in the ultrasonic instrument can obscure the view of the operative site.*

Recommended Anti-Infective Agents

0.12% Chlorhexidine (Peridex)—Undiluted

10% Povidone Iodine—Undiluted

5% Povidone Iodine—Diluted (above mixed 50:50 with water)

10% Povidone Iodine mixed 50:50 with 3% Hydrogen Peroxide

(Not recommended for use in ultrasonic instruments.)

Systemic Antibiotics: Antibiotics should be considered for use on high-risk periodontal patients during the initial cleaning visits. The purpose of systemic antibiotic usage is to optimize healing and reduce the chances of re-infection of the periodontal pocket. Systemic antibiotics do this by eliminating periodontal pathogens that have penetrated gingival tissues. *Antibiotics should only be used in conjunction with the initial full mouth cleaning. Antibiotic use without full mouth root debridement is of very little benefit.* Systemic antibiotic use should be considered during the initial cleaning visits on any high-risk individual 14-35 years of age who has two or more sextants of CPITN 4 scores. If no health related contraindications exist, antibiotics should be prescribed to high-risk individuals for a period of 7-10 days. During this period of time the entire mouth should be thoroughly cleaned (usually two appointments). The antibiotic recommended for routine use is Doxycycline. Doxycycline is a long-acting tetracycline that is effective against most periodontal pathogens (Gram negative facultative and anaerobic rods). Doxycycline, because of its long-term action, requires the patient to take only one capsule each day, thus enhancing patient compliance. However, patients who forget to take their capsule will miss an entire day of medication. Doxycycline is also relatively inexpensive since it has become a generic drug. Doxycycline should be prescribed as follows:

Rx: Doxycycline 100 mg

Disp. 11 capsules

Sig. 1 capsule q. 12 hours for the first day

then 1 capsule each day until all are taken.

If Doxycycline cannot be given, or if a refractory disease condition exists, Augmentin 500 mg can be substituted. Augmentin should be taken three times per day, and the prescription should read:

Rx: Augmentin 500 mg

Disp: 30 capsules

Sig: 1 capsule q. 8 hours until all are taken.

Systemic antibiotics can be helpful in achieving maximum results from the initial patient prophylaxis. However the benefits of systemic antibiotics in this usage scheme must be weighed against their associated problems. Frequent antibiotic use can promote resistant bacterial strains. Antibiotics often cause significant side effects, such as, allergic reaction, nausea, diarrhea, upset stomach and fungal overgrowths. It is therefore recommended that systemic antibiotics be administered to high-risk individuals only during the initial debridement process. Antibiotics need not be prescribed again during recall cleanings unless a refractory condition exists. The frequency of antibiotic use in conjunction with subsequent debridements has not been established. Therefore, repeating the use of systemic antibiotics will remain a professional judgment decision until studies provide sound guidelines.

d. Recall for High-Risk Patients

High-risk periodontal patients will require frequent individualized recall throughout their lives. Recall appointment intervals should be from 1 to 6 months, based on the patient's individual needs. Maintenance appointments should emphasize OHI, subgingival cleaning, use of chemotherapeutic agents, follow-up pocket depth measurements, and encouragement of home care. In addition, high risk individuals may also be targeted for informational mailings regarding their risk for periodontal disease and need for frequent dental visits.

Recall or maintenance care is the key to the success of the periodontal disease prevention and treatment program. High-risk periodontal patients must be identified and continuously followed. This will require a significant effort in establishing and maintaining a high-risk patient register. As automated patient record handling becomes available, such as the Resource and Patient Management System (RPMS), the RPMS/Dental Data System (DDS) package, or personal computers, patient register maintenance will become easier.

2. Moderate-Risk Patients

Treatment
Needs
CPITN 0-3

POPULATION PERIODONTAL TREATMENT NEEDS USING CPITN			
CPITN SCORES	TREATMENT NEEDS		
0	ORAL HYGIENE INSTRUCTIONS (OHI)		
1	OHI		
2	OHI AND PROPHY		
3	OHI AND PROPHY		
≥4	AGE DETERMINES RISK CATEGORY		
Deep Pockets	14 – 35 YEARS HIGH RISK	36 – 59 YEARS MODERATE RISK	
	OHI High Intensity, Non-Surgical Chemotherapy Active Recall	OHI Closed or Open Root Debridement Optional Recall	

a. Moderate-Risk (or Advanced Disease)

Once the needs of the high-risk group have been addressed, the dental manager can consider the formidable task of treating individuals from the moderate-risk category. The moderate-risk group can be expected to make up 70-80% of any given population. Unlike high-risk people, individuals with moderate-risk will likely retain a functional dentition (20 or more teeth) for most of their lives. Studies have shown that while the moderate-risk people will retain 20 or more teeth, they will also develop deep periodontal pockets in the 4th, 5th, and 6th decades of life. Longitudinal tooth loss studies indicate that moderate-risk individuals will experience some tooth loss, usually maxillary and mandibular second and first molars, followed by incisor teeth. While the definition of a functional dentition describes a minimal masticatory ability, it is somewhat misleading, because it fails to account for the likely presence of advanced periodontitis. Clearly, individuals with moderate risk for periodontal disease will present with periodontal treatment needs in the second half of their lives.

b. Treatment for Moderate-Risk (or Advanced Disease) Patients

Due to the slower rate of periodontal disease progression in moderate-risk individuals, the treatment approach can be less intense than that provided to the high-risk patient. Under this model, less frequent recall would be required of the moderate-risk patients. However, the goals of treatment (root debridement and oral hygiene maintenance), are the same for both the high-and moderate-risk groups. For many patients, twenty-five or

thirty years of poor oral hygiene, subgingival calculus accumulation, and untreated disease have resulted in only moderate bone loss. For these somewhat periodontal disease-resistant patients, a single, thorough supra- and subgingival cleaning will provide dramatic reductions in the progression of periodontal breakdown. The benefits of the periodontal debridement will be long-lasting due to the slow reformation of plaque retentive features (calculus) and harmful bacteria.

The usual approach to treatment of moderate-risk patients is closed (non-surgical), subgingival root debridement. Local anesthetic is usually indicated to assure patient comfort and allow for thorough root debridement. However, a case could be made for a single episode of (surgical) open flap curettage. Although this procedure would require slightly more clinical time, the advantage is a more complete debridement due to direct visualization of the root surfaces. More operator skill is required for the open flap procedures.

c. Recall for Moderate-Risk Patients

Dental research has established that periodontal health can be maintained through continuous 3-month professional prophylaxis. However, this research does not account for individual periodontal risks. For moderate-risk patients, it is reasonable for the dental provider to consider recall intervals longer than 3 months. Annual or even longer recall visits may be prescribed, based on the patient's individual needs, clinic resources, and program priorities. Again, the moderate-risk group accounts for the majority of any population. Therefore, it is doubtful that any publicly-funded program would have the resources necessary to provide 3-month recall to the entire moderate-risk group.

3. Low-Risk Patients

Treatment
Needs
CPITN 0-3

POPULATION PERIODONTAL TREATMENT NEEDS USING CPITN			
CPITN SCORES	TREATMENT NEEDS		
0	ORAL HYGIENE INSTRUCTIONS (OHI)		
1	OHI		
2	OHI AND PROPHY		
3	OHI AND PROPHY		
≥4	AGE DETERMINES RISK CATEGORY		
Deep Pockets	14 – 35 YEARS HIGH RISK	36 – 59 YEARS MODERATE RISK	≥60 YEARS LOW RISK
	OHI High Intensity, Non-Surgical Chemotherapy Active Recall	OHI Closed or Open Root Debridement Optional Recall	OHI Closed Root Debridement Optional Recall

Low-Risk Patients: Members of the low periodontal disease risk group are a fortunate few. Despite 40 or more years of exposure to oral bacteria, these individuals have either failed to develop periodontal breakdown or their attachment and bone loss is minimal. *Indeed, true low-risk people will probably never develop deep pockets.* This fact essentially eliminates this group as a risk group. Therefore, the final working periodontal risk model can be reduced to the following:

POPULATION PERIODONTAL TREATMENT NEEDS USING CPITN		
CPITN SCORES	TREATMENT NEEDS	
0	ORAL HYGIENE INSTRUCTIONS (OHI)	
1	OHI	
2	OHI AND PROPHY	
3	OHI AND PROPHY	
≥4	AGE DETERMINES RISK CATEGORY	
Deep Pockets	14 – 35 YEARS HIGH RISK OHI High Intensity, Non-Surgical Chemotherapy Active Recall	36 YEARS and OLDER MODERATE RISK or ADVANCED DISEASE OHI Closed or Open Root Debridement Selective Recall (as resources allow)

Summary

The intent of the Risk-Based Periodontal Disease Treatment model is to provide the dental public health provider with a rational approach for identifying and prioritizing periodontal treatment within a population. This model uses CPITN scores and age for predicting periodontal risks and treatment priorities. High-risk individuals should receive the highest priority for care. Generally, treatment is based on root debridement and periodic recall. Ultrasonic instruments are utilized due to their efficiency and ease of operation. Chemotherapeutics, such as anti-infective agents and systemic antibiotics, are suggested for those at high risk for periodontal disease. Special efforts should be taken to educate high-risk patients concerning their disease risk and self-care and treatment needs. High-risk individuals should also receive every opportunity for frequent and continuous recall. Moderate-risk or advanced disease patients will receive less intense treatment and recall. The ability to treat moderate-risk or advanced-disease individuals from a given population or community will be dependent on the desires, abilities, and resources of the local dental providers.

Periodontal Disease Treatment Protocol for Individuals with Non-Insulin Dependent Diabetes Mellitus

The following treatment protocol has been developed, based upon the findings of the periodontal disease clinical trial conducted on Pimas with non-insulin dependent diabetes mellitus (NIDDM) at the Sacaton Indian Health Service facility.

I. Dental Examination

A thorough dental examination should be conducted on each patient. Bite-wing and panoramic radiographs should be obtained as a minimum requirement. Additional x-rays, such as vertical bitewings and periapicals, can be taken as needed. A complete medical history should also be taken at this time to determine health status, including the presence of an established diagnosis of NIDDM.

Periodontal evaluation: The Community Periodontal Index of Treatment Needs (CPITN) or the Periodontal Screening and Recording (PSR) index should be used to determine the periodontal status during each dental examination. The deepest pocket in each sextant should be identified and recorded based on radiographic evidence and probing with the World Health Organization (WHO) probe. *The treatment protocol should be implemented on all consenting dental patients who present with **both** of the following conditions:*

- An established diagnosis of NIDDM
- CPITN scores of 4 in *two or more* sextants

A determination should also be made at this time of teeth with a hopeless periodontal prognosis. Hopeless teeth are those that are visibly depressible and/or have one or more apices that can be instrumented. Hopeless teeth can be removed at the appropriate time during treatment.

II. Dental Treatment Planning

The priority of dental treatment is an important element of the overall treatment plan.

Emergency or acute disease obviously takes precedence over chronic conditions.

However, once the acute problems have been addressed, it is often difficult to establish a rank order of treatment priorities. Balancing chief complaints, chronic conditions, prosthetic needs, and clinic resources can challenge the dental provider's treatment planning skills.

For individuals who qualify for the periodontal disease treatment protocol, i.e. diabetics with two or more sextants of CPITN score of 4, the following treatment planning order of priority should be followed:

1. Emergency Care (trauma, acute pain and infections, etc.)
2. Control of rampant caries and Imminent Pulpal Involvement
3. Initial Periodontal Therapy (full mouth treatment)
4. Restorative Treatment
5. Elective Surgical Treatment (3rd molars, perio, etc.)
6. Prosthetics
7. Other Higher Levels of Care

As can be seen from the order of treatment above, individuals with NIDDM and periodontal disease should be considered to have an acute condition rather than a chronic one. This elevates the periodontal disease treatment priority for the diabetic patient.

III. Initial Periodontal Treatment

The periodontal treatment protocol for dental patients with NIDDM uses a combination of non-surgical instrumentation (ultrasonic) with a systemic antibiotic and anti-infective agent irrigation. The protocol calls for two half-mouth treatment sessions which are usually scheduled one hour per session. A description of the treatment protocol follows:

A. Piezon Master 400 Set-up

The EMS/Biotrol Piezon Master 400® will serve as the standard ultrasonic instrument for this treatment protocol.

1. Preparation of Irrigant Solution:

- a. Chlorhexidine solution:

Use Peridex® (0.12% chlorhexidine, Procter & Gamble) as the irrigant of first choice. Place the chlorhexidine in the plastic irrigant bottle provided with the Piezon Master. Fill the bottle approximately 3/4 full. *Peridex should be used full strength and never diluted.* (The 0.12% chlorhexidine is FDA-approved at a minimum effective concentration.)

- b. Alternative Solution — Iodine:

A 5% iodine solution can be used if Peridex is unavailable or the patient has a known allergy to chlorhexidine. To prepare the 5% Iodine solution, mix equal parts of 10% povidone iodine (Betadine®) with sterile saline solution (0.9% sodium chloride irrigating solution, e.g., USP from Baxter). The Betadine or other generic 10% povidone iodine solutions can be obtained from all Indian Health Service (IHS) pharmacies, usually in 16 ounce bottles. Fill the plastic irrigant bottle provided with the Piezon Master 400 approximately 3/4 full with the prepared 5% iodine solution.

Note: If iodine is to be used as the irrigating solution, the patient's clothing should be appropriately protected from the potential staining of the iodine solution. A surgical drape can be used for this purpose.

2. Plug in the Piezon Master 400 and turn on switch on the back of the machine. Be sure the selector switch found on the right side of the Piezon Master is in the scaling/irrigating position. Place the plastic bottle containing the irrigating solution into the receptacle on the top of the machine, and with a gentle

clockwise 1/2 turn, lock the bottle into position. Use high power and high volume settings for the Piezon Master (approximately $\geq 3/4$ maximum settings for power and irrigant volume).

3. The Piezon Master is ready to use.

B. Initial Treatment Procedure

1. Oral Hygiene

Oral hygiene instructions should be given, emphasizing the use of a soft bristle brush and rubber tip. A brush and rubber tip should be given to the patient at this time. For patients with sufficient interproximal space, interproximal brushes may be demonstrated and provided. However, in order not to overwhelm the patient at the first visit, it is helpful to phase in the oral hygiene instructions. Simple techniques of brushing and rubber tipping can be introduced initially, while more advanced home care instructions, such as proxabrush and floss use, can be taught at subsequent visits.

2. Set up the Piezon Master and have a mirror, explorer, and probe available.
3. Anesthetize upper and lower quadrants on the same side of the mouth.

Begin from the distal of the last tooth and continue to the midline. Use nerve blocks or regional anesthesia as appropriate. Once the anesthetic from these injections has taken effect, inject every interdental papilla. For routine anesthesia, use xylocaine with 1:100,000 epinephrine. Other anesthetics can be utilized, as indicated by existing patient health conditions.

4. Initial Ultrasonic Debridement

The “P” tip should be selected and placed on the Piezon Master handpiece for the initial debridement procedure. The “P” tip should be considered the universal operating tip for subgingival use.

*Note: During operation, the Piezon Master moves the instrument tip in a linear, back-and-forth motion. For this reason, the Piezon Master tip is effective **only** when the thin, blade-like edge of the tip is applied to the tooth surface. This is unlike the magnetostrictive instruments, such as the Dentsply Cavitron®, which moves its instrument tip three-dimensionally, or in all directions.*

Piezon Master
Operation

Start on the distal of the most posterior tooth of the given quadrant and proceed around the buccal aspects to the midline with the Piezon Master, placing the tip of the instrument apically along the axis of the tooth until bony resistance is felt. You should feel the osseous tissue and the contours of the tooth as this process occurs. Debride all surfaces carefully. Although the procedure emphasis is on root debridement, all supragingival calculus should also be removed. Irrigate approximately one minute per tooth as you proceed around the buccal/facial. Repeat the ultrasonic debridement from the lingual, again debriding one minute per tooth. Granulation tissue, pocket epithelium and plaque will be removed and often the interdental papilla will be released. It is important to go to the depths of the pocket and completely (360°) around each tooth to remove all plaque and calculus in the lateral and apical projections of the pockets. It is also important to remove the diseased cementum into which bacteria and calculus have penetrated.

5. Check all surfaces for smoothness and hardness.
6. Final Ultrasonic Debridement
 - a. Debride again with the Piezon Master using irrigating solution, approximately 30 seconds per tooth, from the buccal and the lingual as in the initial debridement. Concentrate on those areas that feel rough upon root surface testing. The total ultrasonic debridement (initial and final) per 2 quadrants may use 6 to 10 ounces of irrigating solution.
 - b. If the interdental papillae become detached as a result of the debridement procedure, simple pressure on both sides of the papilla (forcing the buccal and lingual papillae back into their natural positions) for several minutes may be all that is necessary. However, for severe displacement of the papillae, suture the buccal and lingual papilla over the interproximal bone with a single interproximal suture. Use 3-0 or 4-0 suture material with no periodontal dressing.
 - c. All overhangs should be removed at this time with the dental handpiece and a flame-shaped or other appropriate bur.
7. Extract all periodontally hopeless teeth at this time.

C. Postoperative Care

1. Patients should be given doxycycline (100 mg bid) for 14 days.

Note: It is essential for patients to be scheduled to receive their second half-mouth initial treatment during the 14-day period while taking the systemic antibiotics.

It is often helpful to make the patient two, one hour treatment appointments following the dental examination. The two appointments should be within a 14-day period of time. This will allow both treatment sessions to occur during the course of antibiotic coverage.

2. The patient should rinse 2 times per day with 30 ml of Peridex solution for two weeks after each debridement procedure.
3. Patients should be given appropriate analgesics (ibuprofen 400 mg, acetaminophen 650 mg, etc.) either before or immediately after the debridement procedure(s). A 7-day supply of these analgesics should also be prescribed to the patient. For patients with lower pain thresholds or in those whom more extensive pain is anticipated, a stronger drug can be prescribed, such as acetaminophen with hydrocodone or codeine.
4. Post-operative emergencies

Treat abscesses with incision and drainage and local irrigation with povidone iodine (10%) and H₂O₂. As an alternative, a small open-flap surgical procedure can often be helpful in gaining access to the affected tooth root as well as encouraging drainage. Do not use systemic antibiotics unless the patient is febrile.

IV. Continuous Periodontal Therapy (Recall)

Results of the Sacaton periodontal disease clinical trial indicate that patients will experience periodontal improvements, i.e., attachment gains, pocket depth reductions, reduced gingival bleeding, etc., for up to six months following the initial debridement procedure(s). Therefore, all patients who are receiving the diabetes/periodontitis treatment protocol should be recalled 6 months following their initial periodontal treatment. According to the study results, the 6-month post-treatment period marks the beginning of harmful bacterial recolonization of the periodontal pockets in NIDDM patients. It is at this time, therefore, periodontal treatment should intervene, by again removing and/or destroying the subgingival periodontal pathogens. *Continuous 6-month treatments should maintain the diabetic patients' periodontal health.* However, because patients who received the initial treatment will return for their 6-month recall in a variety of clinical conditions, it is necessary to conduct a periodontal examination at the recall visit. The periodontal examination will document the response from the initial treatment and thereby determine the appropriate follow-up therapy. The procedures listed below should be followed for the 6-month recall visits:

A. 6-Month Recall and Periodontal Examination

At the first 6-month visit, and at all subsequent 6-month recalls, a periodontal pocket assessment must be conducted in all sextants. Using the CPITN, the deepest pockets must be identified and recorded in each sextant. *The extent of treatment will be based on the presence or absence of deep pockets.* Deep pockets are defined as CPITN scores = 4 (≥ 6 mm in depth).

1. Deep Pockets — Retreatment Procedure (CPITN=4)

The identification of deep pockets (CPITN=4) in any area of the mouth, 6-months following initial treatment, *or at any recall visit*, will require retreatment. Retreatment should be performed only in those specific sites where deep pockets exist. No attempt should be made to retreat the entire sextant or full mouth unless deep pockets are generalized. The retreatment procedure should follow that described in the initial periodontal treatment section above.

Piezon Master 400 set-up:

The instrument set-up for follow-up treatment is the same as that of the initial treatment(s). A Piezon Master 400 will serve again as the primary instrument. Peridex will also be used as the irrigating agent. As an alternative, a 5% iodine

solution can be used for those individuals sensitive to chlorhexidine. *The Piezon Master “P” tip is recommended for most retreatment procedures.*

a. Local Anesthesia

Local anesthesia will be required for those specific sites which will require retreatment. Xylocaine with 1:100,000 epinephrine is again recommended for use during this procedure.

b. Calculus Removal

Heavy subgingival calculus should not be expected at the subsequent recall appointments. However, light, supragingival calculus may be encountered, particularly in mandibular anterior areas and the buccal aspects of maxillary molars. All calculus should be thoroughly removed at recall visits.

c. Retreatment Procedure

As described in the initial treatment procedure, the tip of the ultrasonic instrument should be applied to the coronal aspect of the tooth. Moving in small circular motions, all soft and hard debris should be removed from the crown and root surfaces. This process should continue apically along the axis of the tooth until bony resistance is felt.

d. Systemic Antibiotics

Systemic antibiotics *should not* be prescribed for retreatment visits.

e. Locally Delivered Antibiotics

Isolated deep pockets are excellent candidates for treatment with locally-delivered antibiotics. Therefore, locally delivered antibiotics can be used in conjunction with the retreatment procedure(s). The currently available commercial product is a non-resorbable, tetracycline-laden fiber called Actisite®. Actisite fibers are packed into deep pockets, where they are left for ten days. The fibers then must be removed from the placement site. The fiber removal requirement obviously means an additional appointment. Therefore, appointment compliance is essential for Actisite use.

2. No Deep Pockets — Deplaquing Procedure (CPITN < 3)

Piezon Master 400 set-up:

The instrument set-up for follow-up treatment is similar to that of the initial treatment(s). A Piezon Master 400 will serve again as the primary instrument. Peridex will also be used as the irrigating agent. As an alternative, a 5% iodine solution can be used for those individuals sensitive to chlorhexidine. *The thinner Piezon Master “PS” tip is recommended for most shallow pocket recall treatment.* This tip is smaller and able to reach into deep pockets without distention of the soft tissue.

a. Local Anesthesia

Usually, no local anesthesia will be required for recall treatment visits. Patient sensitivity can normally be controlled through adjustment of the Piezon Master power setting. For very sensitive patients, however, local anesthesia may be needed.

b. Calculus Removal

Heavy subgingival calculus should not be expected at the subsequent recall appointments. However, light, supragingival calculus may be encountered, particularly in mandibular anterior areas. All calculus should be thoroughly removed at recall visits.

c. Deplaquing

The main objective of 6-month continuous periodontal treatment is the removal of all soft root debris and disinfection of the periodontal pocket. The process of removing the soft, bacterial plaque is often referred to as “deplaquing.” The deplaquing procedure should be carried out with the Piezon Master “PS” tip, as described above. All supra- and subgingival tooth surfaces should be meticulously debrided and irrigated using the ultrasonic instrument and chlorhexidine irrigant.

Note: A significant difference in the debridement procedures exist between the initial treatment(s) and subsequent recall or continuous therapy visits. Debridement apically “until bony resistance is felt,” should be performed only during the initial treatment visits. Recall treatment should involve debriding root surfaces apically only to the level of soft tissue attachment, i.e., to the base of the periodontal pocket. In order to maintain periodontal attachment gains, no attempt should

be made to feel the osseous tissue during the debridement procedures at recall visits where CPITN scores are < 4.

d. Systemic Antibiotics

No systemic antibiotics will be required at 6-month recall visits. Exceptions may occur to this general rule for refractory patients. However, consultation with a periodontist is suggested to determine specific therapy.

Note: Some patients may demonstrate periodontal abscess formation and/or generalized pocket suppuration prior to the 6-month return visit. These “refractory” patients will require more frequent and perhaps more specific periodontal therapy. Consultation with a periodontist for treatment and possible bacterial culturing is recommended for these individuals.

B. 12-Months and Beyond (Continuous 6-Month Recall)

It is obvious that individuals with NIDDM and periodontal disease will require constant monitoring and continuous periodontal therapy as long as they have NIDDM and teeth. The treatment protocol described above allows the dental provider to effectively manage NIDDM patients who are at higher risk for periodontal breakdown. A continuous 6-month recall treatment for life is recommended for most protocol patients. For individuals who practice excellent oral hygiene and whose periodontal tissues remain healthy, recall intervals longer than 6 months can be contemplated. *Each dental provider will have to assess at each appointment the status and progress for their NIDDM periodontal patients.* However, even for periodontally stable patients, periodic monitoring of periodontal status is essential for the maintenance of periodontal health.

The provision of an effective treatment protocol for NIDDM individuals with periodontal disease is important. However, clinic management activities are also essential in order to carry out the treatment program. The establishment of the following systematic approaches to support the treatment protocol are also suggested:

1. NIDDM/Periodontal Patient Register

The establishment of a method of identifying and following NIDDM dental patients is necessary for any long-term patient success. Currently, stand alone personal computers with database software or the RPMS/DDS systems exist which would allow the development of a NIDDM dental patient register (database) and tracking system. Any number of other systems are possible, including a notebook and pencil! *Without an adequate system of tracking*

patients and their recall needs, the treatment protocol will not provide long-term health benefits.

2. Patient Monitoring

In order to determine the long-term success of the treatment, clinical status measurements will need to be obtained for each patient at some regular time interval. Unfortunately, CPITN/PSR serve only as crude indicators of periodontal status. For a more definitive measure of periodontal health, a full-mouth probing and recording is recommended at least annually for patients on the NIDDM/periodontitis protocol register.

3. Program Drop-Outs

It is inevitable that some individuals receiving the treatment protocol will choose not to continue with the program. This non-compliance will manifest itself in many different ways. Some patients will return every 6 months, some once a year, and others only occasionally. Two important issues are faced with non-compliant patients:

a. Clinic Access

An important question arises concerning what clinic access non-compliant patients should have? *For periodontal patients with NIDDM, special clinic access should be afforded despite less than perfect compliance.* Diabetics with periodontal disease represent a special “risk-group” within the population. As such, extra efforts should be expended in attempting to reach this group. Although problems will occur with broken and canceled appointments for these patients, continued special clinic access should be given. Compensation for broken appointments can be managed in several different ways, e.g., over-scheduling, local call-back lists, confirming appointments, etc.

b. Back To Go

At some point, the question will occur for “protocol drop-outs,” who periodically present to the dental clinic ... Shouldn’t this patient start all over with the treatment? The clinical conditions which would indicate starting the treatment protocol over are somewhat variable. However, here are some general rules to follow:

Protocol
Dropouts

— Patients who did not finish the initial treatment:

For patients who received only partial initial treatment and then dropped out (and it has been less than three years), initial treatment protocol can be performed on the untreated portion of the mouth using chlorhexidine and doxycycline as per the protocol. The previously treated area of the mouth can be debrided according to the 6-month recall instructions, i.e., the presence or absence of deep pockets. From this point on, 6-month recall visits should be scheduled.

— Patients who finished initial treatment, then dropped out:

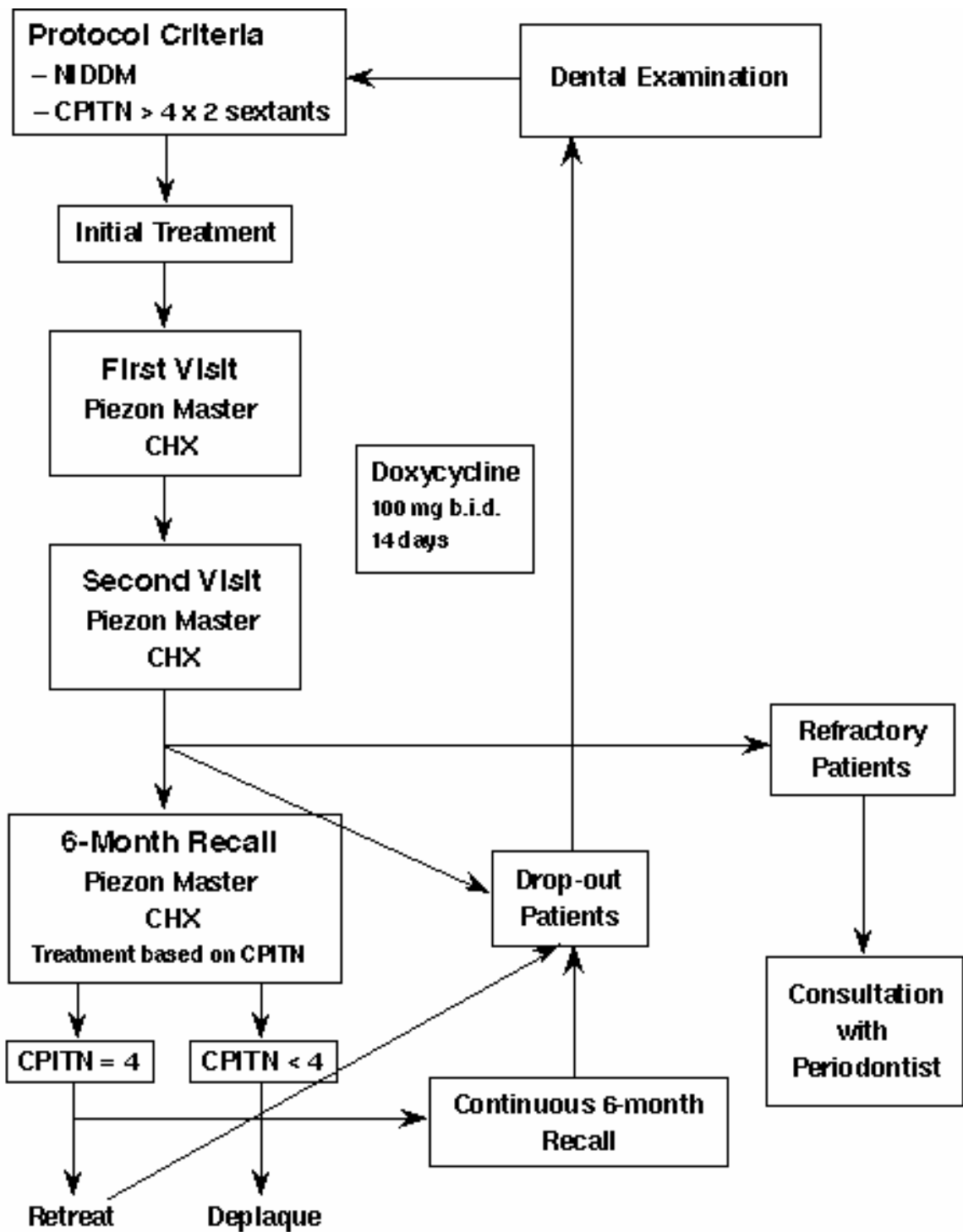
< 3 years since initial treatment: Schedule patient for 6-month recall treatment procedures (based on CPITN scores), with 6-month recall.

> 3 years since initial treatment: Schedule patient to begin initial treatment protocol again, with 6-month recalls.

4. Staff Training Needs

Training of the dental staff in the implementation of this protocol is important prior to beginning the first treatment. However, after the initial training needs have been met, ongoing program monitoring, maintaining quality of care among the providers, and training new staff members will provide continuous training challenges for dental managers.

V. Treatment Protocol Quick Reference Guide



Oral and Oropharyngeal Cancer: Prevention and Early Detection

There are approximately 28,150 new cases of oral and oropharyngeal cancer per year in the United States and about 8,370 deaths from these diseases (1). Incidence is twice as high in men as in women, and 95 percent occurs in persons over the age of 40.

Incidence and
Survival Rates

Approximately 50 percent of persons diagnosed with oral cancer survive less than five years after diagnosis. Of the 13 major cancer sites, oral cancer has the fifth lowest survival rate. Incidence of oral and oropharyngeal cancer and survival rates, as well as stages when detected, appear to be related more to socioeconomic factors than to ethnic differences.

Several surveys have shown that a large percentage of the American Indian/Alaska Native (AI/AN) population engage in behaviors that place them at high risk for oral and oropharyngeal cancers. These behaviors include the frequent use of alcohol and tobacco products. Of particular concern is that in some areas 30 to 50 percent of AI/AN children and teenagers routinely use smokeless tobacco (2). The report of the Advisory Committee to the Surgeon General on “The Health Consequences of Using Smokeless Tobacco” in 1986 made it clear that “the oral use of smokeless tobacco represents a significant health risk” and “can cause cancer (3).”

AI/AN Risk
Factors

A view widely shared among IHS dentists and physicians, but yet to be proven scientifically, is that oral and oropharyngeal cancer rates in Native Americans are low, despite the prevalence of high-risk behavior. Nevertheless, the importance of early detection as a means of increasing the five-year survival rate and decreasing survival morbidity of persons with these cancers cannot be overstated (4). Over half of oral cancers have metastasized or become invasive by the time they are diagnosed (5). Oral cancer may be painless or otherwise asymptomatic in its early stages. This underlines the importance of guaranteed access to care and regular oral examinations, including a thorough soft tissue examination for all dental patients. Of equal or greater importance is the need to educate patients regarding the risk factors and warning signs associated with these cancers.

Early Detection

Oral cancer prevention programs should therefore include the following activities:

1. Thorough soft tissue examinations of all patients, including emergency encounters, with documentation of normal and abnormal findings in the medical or dental chart. This should include careful examination for cancerous lesions of the oral cavity, especially in the elderly and in patients who use tobacco and/or excessive amounts of alcohol, as well as in those with suspicious symptoms or self-identified lesions.

Soft-Tissue Exams
for All Patients

Cancer Prevention
Planning

2. Documentation of individual preventive planning for all dental patients who present for an initial or periodic oral exam, which includes asking adults and adolescents to describe their use of tobacco and alcohol and offering appropriate counseling referrals for those who smoke, use smokeless tobacco, present evidence of alcohol abuse, or have chronic occupational exposure to sunlight. Information on tobacco use is to be documented on the preventive assessment section of the dental exam form and also should be included in the health history questionnaire.

In-Service
Training

3. In-service training for medical staff (including physicians, nurses, and physician's assistants) in oral and oropharyngeal cancer etiology, pathogenesis, detection, and prevention. They should be encouraged to include inspection of the oral soft tissue in routine physical examinations, especially in geriatric patients and in patients who use tobacco and alcohol.

Education

4. Individual and community education concerning the risk factors and warning signs associated with oral and oropharyngeal cancer, including discussion of smoking, smokeless tobacco, sun exposure, alcohol, and local irritants.
5. School-based education on the hazards of smoking and smokeless tobacco use; school and community-based cessation programs.
6. Community-based prevention and intervention strategies. Some examples of intervention/cessation programs follow:

ASSIST

- a. The National Cancer Institute (NCI) and the American Cancer Society have recently joined forces to mount the largest demonstration project for tobacco control ever conducted. The project, the America Stop-Smoking Intervention Study (ASSIST) (6), is designed to reach over one-fifth of the U.S. population and at least 15 million smokers through community-based tobacco control coalitions. The NCI encourages the involvement of dental professionals in tobacco issues and this project. This project is community oriented. It provides "an excellent opportunity for dentistry to become involved with a social concern that affects oral health as well as general health and public well being" (Dr. Mecklenburg). Further information may be obtained from the NCI Smoking, Tobacco and Cancer Program at (301) 496-8520.
- b. Successful tobacco use interventions include drug-based cessation programs using pharmacologic nicotine and combined drug and behavioral tobacco cessation programs. Methods that have not proven successful are acupuncture, hypnosis, over-the-counter medications and

nostrums. Tobacco cessation strategies can be reinforced through psychological counseling, group therapy, or self-help programs.

- | | | |
|----|--|--|
| c. | An example of a multi-method approach to tobacco cessation is the Stanford Stop Smoking Program. This program uses a pharmacological agent (nicotine gum is now available over-the-counter), self-control strategies, a set of self-help manuals, and a personal contract setting a quit date. A sample package is available at no charge through the Stanford Center for Research in Disease Prevention, Stanford University, Stanford, CA 94305. Excellent self-help materials are also available through the American Cancer Society and the American Lung Association. | Stanford Stop
Smoking Program |
| d. | The Minnesota Plan for Nonsmoking and Health is a comprehensive report outlining a variety of strategies for preventing young people from smoking and assisting smokers to quit. Information on this report can be obtained from the Minnesota Center for Nonsmoking and Health, (612) 623-5500. | Minnesota Plan
for Nonsmoking
and Health |
| e. | A "Dental Quit Kit," with a videotape from Indiana University School of Dentistry and a number of educational materials from various sources, is available from Lakeside Pharmaceuticals, P.O. Box 429553, Cincinnati, Ohio 45242-9553; telephone number (513) 948-6040. | Dental Quit Kit |
| f. | Health care professionals are in an uniquely favorable position to influence their patients' tobacco use behavior. Dr. Louis Sullivan, former Secretary for Health and Human Services, estimates that if every physician routinely counseled his or her patients about the dangers of tobacco use and encouraged them to quit smoking, at least one million Americans would stop smoking in one year. Dentists can be equally effective in promoting tobacco avoidance by showing patients the tangible drawbacks of tobacco use, such as staining of teeth, bad breath, etc. During routine oral examinations, dentists can inform their patients that tobacco causes oral and other types of cancer. They can join their medical colleagues in encouraging their patients who use tobacco to enter tobacco cessation programs. | Counseling by
Health Care
Professionals |
| g. | A guide for clinical intervention, "Clinical Opportunities for Smoking Intervention," is available from the Public Health Service, National Institutes of Health. NIH Publication No. 86-2178, August 1986. This guide describes specific ways that dentists and physicians can promote tobacco cessation, including the following: | |

- Act as a role model by not using tobacco and creating a tobacco-free environment.
- Provide information on risks associated with tobacco and reduction of risk if the patient stops.
- Encourage abstinence by direct advice and suggestions.
- Refer the patient to a tobacco cessation program.
- Prescribe and follow up on use of specific cessation and maintenance strategies.

The U.S. Preventive Task Force questions the efficacy of routine screening examinations for oral cancer by primary clinicians for all asymptomatic persons. However, it does recommend that all patients should be counseled to receive regular (annual) dental examinations, to discontinue the use of all forms of tobacco, and to limit consumption of alcohol. It also recommends that persons with increased exposure to sunlight should be advised to take measures to protect their lips and skin from the harmful effects of ultraviolet rays (8).

Oral Examination Procedures

A complete oral examination must include both inspection and digital palpation of circumoral as well as intraoral structures. Adequate lighting, a tongue blade or depressor, a dental mirror, some strips of gauze, and rubber gloves or finger cots are the only materials required. The examination should be systematic and repeatable. It should include all hard and soft tissues and underlying structures of the oral and perioral region, with attention given to color, tissue tone, surface texture, and radiological findings. The following sequence is recommended:

1. Obtain a thorough medical history. Question patient about alcohol and tobacco use and occupational sun exposure.
2. Visually inspect the head and neck for keratoses, ulcers, unusual pigmentation, skin blemishes, asymmetry, and abnormal masses.
3. Palpate the regions of the major salivary glands and the lymph nodes of the head and neck, noting any abnormal swelling, masses, or indurations.
4. Inspect and palpate the external vermillion border and the commissures of the lips.
5. Thoroughly examine the intraoral cavity, proceeding from anterior to posterior oral structures and pharynx. The sequence may be: lips, buccal mucosa, floor

of the mouth, tongue, hard and soft palate, faucial arches and tonsils, posterior pharynx, retromolar areas, teeth and gingiva. To properly inspect the tongue, it should be grasped with gauze and pulled forward to expose the lateral borders, while the cheek is retracted with a tongue blade or dental mirror. Following careful inspection, these areas should be thoroughly palpated with thumb and index finger of the gloved hand to detect areas of swelling, roughness, induration, or asymmetry.

In 1987, the National Institute of Dental Research suggested the following classification system of mucosal lesions associated with smokeless tobacco use (9-11):

Classification of Lesions

- | | |
|-----------------|--|
| Degree 1 | Slight superficial wrinkling of the mucosa. Color of the mucosa may range from normal to pale white or gray. Mucosa does not appear to be thickened. |
| Degree 2 | Distinct whitish, grayish, or occasionally reddish color change. Wrinkling is obvious, but there is no thickening of the mucosa. |
| Degree 3 | Mucosa is obviously thickened, with distinct whitish or grayish color change. Deep furrows are present within the thickened area. |

Although self examination has been an effective form of screening for some types of cancer, such as breast cancer, the efficacy of self screening for oral and oropharyngeal cancer is questionable, except for lip cancer. The time required for the dentist to teach patients self examination techniques might be better spent in performing thorough soft tissue examinations, counseling patients regarding high risk behaviors and the recognition of warning signs, and teaching other health care professionals oral soft tissue examination techniques.

Warning Signs Of Oral And Oropharyngeal Cancers (13)

1. A swelling, lump, or growth in or about the mouth, with or without pain
2. White, scaly patches or red, velvety areas in or about the mouth
3. A sore or ulceration in or about the mouth that does not heal within two weeks
4. Numbness or tingling in any part of the mouth
5. Repeated bleeding for no apparent reason
6. Loosening of teeth with no apparent cause

7. Excessive dryness or wetness of the mouth
8. Prolonged hoarseness, sore throat, persistent cough, or the feeling of a “lump in the throat”
9. Difficulty in chewing, swallowing, speaking, or opening the mouth

High-Risk Groups

1. Persons who use tobacco
2. Persons who drink alcohol
3. Persons with a history of cancer or premalignant lesions
4. Professions that are chronically exposed to the sun (e.g., farmers, sailors, fishermen)
5. Males over age 40

Toluidine Blue

The use of toluidine blue (tolonium chloride) vital stain has been advocated by some oral cancer experts as diagnostic adjunct to subjective clinical impression in detecting oral cancer (14). While staining of early mucosal cancers is more objective than clinical impressions without staining, familiarity with stain interpretation is necessary. This technique is not recommended as a routine screening tool for IHS general practitioners. The U.S. Preventive Task Force stated that further research is needed to evaluate the accuracy and acceptability of this technique before routine use in the general population can be considered (15). Exfoliative cytology, while used extensively in the diagnosis of less visible and accessible lesions, it is not a substitute for biopsy in the diagnosis of oral cancer, although it can be a useful diagnostic adjunct in some cases. A problem with exfoliative cytology is the suspected frequency of false negatives, which can lead to a false sense of security (16). For definitive diagnosis of oral cancer, excisional or incisional biopsy is essential (11, 17).

(It should be noted that approximately 400,000 patients per year develop oral complications as a result of cancer therapy. Following diagnosis of any cancer, a pre-treatment oral examination is vital to identify pre-existing oral problems which may have an impact on cancer therapy).

Conclusion: Early detection of oral and oropharyngeal cancers result in more easily treated lesions with less post-treatment morbidity and increased survival rates (18). An effective primary preventive program should include public awareness of the disease, including knowledge of warning signs and risk factors. It should also include education

of medical and paramedical personnel in the symptomatology and pathogenesis of these cancers and training in early detection techniques. The avoidance of tobacco products in any form, particularly in combination with heavy alcohol consumption, is crucial to the prevention of oral and oropharyngeal cancer (19).

References:

1. Cancer Facts and Figures, 1995. American Cancer Society.
2. Bruerd B. Smokeless use among American school children.
3. The health consequences of using smokeless tobacco: A report of the advisory committee to the surgeon. 1986;Preface: vii.
4. Mashberg A, Samit A. Early detection, diagnosis, and management of oral oropharyngeal cancer. American Cancer Society Professional Education Publication 1989: 1. (Reprinted from *Ca — A Cancer Journal for Clinicians* 1989;39:67-68, 1989.)
5. DiGuseppi C, Atkins D, Woolf SH, editors. US Preventive Services Task Force. Guide to clinical preventive services. 2nd ed. Alexandria, VA: International Medical Publishing, 1996: 61.
6. America Stop-Smoking Intervention Study (ASSIST). For information on this program, contact Dr. Robert Mecklenburg, 12304 River's Edge, Potomac, MD 20854, (301) 330-9409.
7. Lichtenstein E, Danaher BG. What can the physician do to assist the patient to stop smoking? COLD: Clinical Treatment and Management, St. Louis, Mosby 1978.
8. DiGuseppi C, Atkins D, Woolf SH, editors. US Preventive Services Task Force. Guide to clinical preventive services. 2nd ed. Alexandria, VA: International Medical Publishing, 1996: 63.
9. Axell T, et. al. International seminar on oral leukoplakia and associated lesions related to tobacco habits. *Community Dent Oral Epidemiol* 1984;12(3):145-54.
10. Greer RO Jr., Poulson TC. Oral tissue alterations associated with the use of smokeless tobacco by teenagers. *J Oral Surg* 1983;56:278-84.
11. Axell T, et al. The relation of the clinical picture to the histopathology of snuff dippers' lesions in a Swedish population. *J Oral Path* 1976;5:229-36.
12. World Health Organization. Guide to epidemiology and diagnosis of oral mucosal diseases and conditions. *Community Dent Oral Epidemiol* 1980;8:1-26.

13. Adapted from Bednarsh H. Oral cancer self-examination. *The Journal — Texas Dental Hygienist's Association* 17, Dng Q Nov-Dec 1979:11-12.
14. Mashberg A, Barsa P. Screening for oral and oropharyngeal squamous carcinomas. American Cancer Society Professional Education Publication, 1984:7-8. (Reprinted from *Ca — A Cancer Journal for Clinicians* 1984;34(5).)
15. DiGuseppi C, Atkins D, Woolf SH, editors. US Preventive Services Task Force. Guide to clinical preventive services. 2nd ed. Alexandria, VA: International Medical Publishing, 1996:61.
16. Baker HW, et al. Oral cancer. American Cancer Society Professional Education Publication 1972, 1973:23-31. (Reprinted from *Ca — A Cancer Journal for Clinicians* 1972;22(1-5), 1973;23(1).)
17. Ibid.: 19-22.
18. Mashberg A, Barsa P. Screening for oral and oropharyngeal squamous carcinomas. American Cancer Society Professional Education Publication 1984: 4. (Reprinted from *Ca — A Cancer Journal for Clinicians* 1984:34(5).)
19. Green J, Louie R, Wycoff S. Preventive dentistry II, periodontal diseases, malocclusion, trauma, and oral cancer. *JAMA* 1990;263:421- 5.

Introduction: Oral Health Education and Promotion

Health education and health promotion are necessary to achieve both individual and community oral health. The ultimate responsibility for oral health must be shared by individuals, families, health professionals, and the program as a whole. Health education can help increase knowledge and reinforce desired behavior patterns, but to be successful, it must be integrated with other influences on health—economic, social, and environmental—all of which affect access and acceptance of preventive programs.

Definitions (From 1990 Joint Committee on Health Education Technology)

Health Promotion and Disease Prevention: Aggregate of all purposeful activities designed to improve personal and public health through a combination of strategies, including the competent implementation of behavioral change strategies, health education, health protection measures, risk factor detection, health enhancement and health maintenance.

Health Literacy: The capacity to obtain, interpret and understand basic health information and services and the competence to use such information and services in ways which are health enhancing.

Health Education Program: A planned combination of activities developed with the involvement of specific populations and based on a needs assessment, sound principles of education and periodic evaluation using a clear set of goals and objectives.

Perceptions,
Attitudes, and
Values

It is clear that education is necessary, but education alone is insufficient to achieve optimum oral health. Knowledge is seldom sufficient to produce behavioral changes. Patients' perceptions, attitudes, and values must also be considered. The target population must have access to proven preventive procedures. The process of ensuring this access involves health promotion. Thus, both health education and health promotion are required to attain and maintain oral health in a community.

Health Promotion
Examples

Examples of health promotion include: community water fluoridation and/or other fluoride regimens, school-based fluoride mouthrinse and sealant programs, and development and modification of curricula and training for personnel who will provide programs.

Methods Used in Community Health Education

- One-to-one communication
- Group presentations/discussions
- Community organizational strategies—forming committees to solve problems
- Disseminating information through mass communication channels such as pamphlets, posters, newspapers, newsletters, radio, and television

Any one or combination of these methods can be used, depending on the objectives to be achieved, the behavior to be influenced, and available resources. Educational efforts should be directed to ensure accurate knowledge and understanding and to maintain interest and support.

Head Start

Interagency Agreement

Since 1976, the Head Start Bureau of the Administration for Children, Youth, and Families and the Indian Health Service have had an interagency agreement that requires the IHS Dental Program to provide training and technical assistance (T/TA) to Head Start Indian Grantee programs. In FY 90 that agreement was expanded to include the other health components of medical, mental health, and nutrition. Head Start's basic philosophy is built on a foundation of family, community, and cultural strengths. Head Start focuses on the positives in every child and family. Because parents are the most powerful role models and teachers for preschool children, preventive efforts must stress parenting and family strengthening.

Head Start Philosophy

Multidisciplinary Effort

A comprehensive approach to T/TA should be developed in order to have an impact on the health of Head Start children. A multidisciplinary effort with Head Start, the IHS, and state and local Governments to coordinate T/TA with other health improvement initiatives and the existing health care systems should be emphasized. Master planning with parents and representatives from Head Start and the Governmental systems should be conducted. Initial planning should focus on parent involvement, health care financing, and the availability of well-trained providers (1).

Dental Training and Technical Assistance Activities

Dental T/TA *may* include the following activities:

1. Participation in the local Head Start Health Advisory Committee.
2. Training of teachers and administrators in dental disease prevention.
3. Dental health education for parents and children, e.g., *Ready! Set! Go!* (IHS publication) and *Bright Smiles/Bright Futures* (Colgate-Palmolive Company).
4. Screening and prioritization of treatment needs.
5. Identifying alternate resources for dental care in the community, such as finding those private practitioners who will see Head Start children, finding dentists who will treat Medicaid-eligible patients, helping families to seek enrollment in Medicaid, and identifying state and local dental public health clinics who will provide care.
6. Helping to link the patient to a system where they may receive emergency and routine dental treatment (see item 2).
7. Follow-up of non-compliance areas identified by monitoring evaluation by outside dental health consultants.

8. Coordination of water testing and systemic tablet programs for those children with inadequate fluoride in their drinking water (Head Start performance standards require a school-based fluoride supplement program if fluoride-deficient water systems exist in the community).
9. Provision of dental health education materials, toothbrushes, fluoride toothpaste, fluoride tablets, and consideration of the use of new products such as fluoride varnish.

Note: Fluoride mouthrinse is not recommended for Head Start children because of the tendency of many children to swallow some of the rinse, which could contribute to dental fluorosis.

Fluoride
Mouthrinse

References

Improving the health of preschool children in Alaska Head Start programs. Training and technical assistance needs inventory report. July 1990.

Head Start program performance standards. U.S. Department of Health and Human Services. Administration for Children, Youth, and Families. Head Start Bureau.

School Programs

Until the late 1970's, the IHS Dental Program focused much of its time and resources on treatment programs for school-aged children. Then the program shifted the emphasis from school programs to the demand care concept, where it remained for most of the 1980's. With currently available community oral disease prevention measures, certain school-based dental programs are once again an effective means of providing services to this age group.

Clinical and Classroom Components

School-based preventive dentistry programs in public schools and Indian schools have been successful in reducing the caries incidence among children (1). These school programs usually have both clinical and classroom components. The clinical component often includes sealants, oral hygiene instruction (OHI), professional prophylaxis, and fluorides. The classroom component often includes self-applied fluorides, classroom education, and school water fluoridation. The type of programs implemented should be based upon risk for dental disease.

Sealants

Sealants are the single most effective measure for preventing dental caries in school-aged children (1). With periodic observation and reapplication when necessary, sealants are effective in reducing the prevalence of pit and fissure caries (2). Since pit and fissure caries account for approximately 90 percent of the caries in children 6-13 years old, school-based prevention programs should include sealants (3).

Fluoridation

Community water fluoridation is still the most effective, yet inexpensive, means of delivering the benefits of fluoride to school-aged children (1). In non-fluoridated communities, school water fluoridation or school-based fluoride tablet programs can provide both systemic and topical benefits of fluoride and are particularly valuable in communities where the caries rate is high (4). Community and school water fluoridation or school-based fluoride tablet program success requires designating responsibility and providing training to water operators or fluoride coordinators. Dental programs frequently provide technical assistance and monitor fluoridation programs operated by Tribal authorities.

Self-Applied Fluoride

Self-applied fluoride (mouthrinses and supervised toothbrushing with a fluoride dentifrice) can provide an additional 20-40 percent reduction in dental decay (5). The decision to implement these programs should be carefully weighed, based on the status of water fluoridation and the caries rates, particularly smooth surface caries rates. Institutions such as schools are an ideal setting for fluoride mouthrinse programs, as high levels of compliance are possible and the beneficial effects are maximized. Many state dental programs provide supplies for fluoride mouthrinse programs.

Classroom teachers are the most effective instructors for school-based oral health education (6, 7) and can incorporate simple, accurate elements of oral health education into routine teaching activities. Dental professional personnel should assist the teacher by evaluating the oral health curriculum, suggesting supplementary material, and providing technical assistance through in-service training (8). A curriculum which offers regular reinforcement of oral health concepts through the school years must be available in order to promote adequate knowledge, skills, and attitudes (KSA) for self-care. Also, the oral health curriculum should be an integrated component of a total health curriculum, if possible. Evaluation of the curriculum can be conducted through KSA surveys before and after the material is presented.

Teachers

School-based oral disease prevention programs should be implemented for all schools with 25-50 percent or more enrolled American Indian/Alaska Native (AI/AN) students. The local Dental Program should identify the schools within the service area and determine where school-based prevention programs could be established. Proper planning for these programs includes obtaining necessary approvals from the principals and school board members and parents. Providing consent forms in school registration packets is an efficient method for obtaining parental permission and can increase participation in these programs.

Targeting of
Schools

Indian schools, including Bureau of Indian Affairs (BIA) and BIA contract schools, are administered following Federal guidelines. A variety of clinical and non-clinical services can be delivered at the school site because BIA schools are not restricted by state and county regulations. School-based prevention programs that include self-applied fluorides, sealants, school water fluoridation, and classroom education should be considered for all BIA schools.

Indian Schools

Public schools must conform to state and local guidelines, consequently the logistics and legalities of school-based prevention programs can be complicated. However, prevention programs in schools with less than 25-50 percent AI/AN children can be established by developing linkages with state and local education departments. The National Preventive Dentistry Demonstration Program has shown that oral disease prevention programs in public schools that include both clinical and classroom elements can be successful (1).

Public Schools

Important elements of a school-based oral disease prevention program are:

1. Pit and Fissure sealants
 - Target grades are often selected for school sealant programs. Children in grades 1, 2, 6, and 7 should be screened, as they are most likely to have newly-erupted molars that meet the criteria for sealant placement (9). However, in communities with high caries rates, it is preferable to see all

grades each year to evaluate retention of sealants, teeth needing sealants, and referral for decay.

- Portable dental equipment is effective for sealant placement and can be brought to the school site. If transportation is available, children can be bused to the clinic for sealant placement.
- Sealants provided in a school setting are reported as Level II clinical services. These programs generally enhance the clinical dental program. It is important for programs not to view sealants as a one-time event for life. Sealants, like other restorations, need to be monitored.
- See the section on sealants for selection and placement guidelines.

Self-Applied Fluorides

2. Self-applied fluorides

- School-based fluoride mouthrinse programs, fluoride tablet programs, and supervised toothbrushing with a fluoride dentifrice are effective ways of delivering the benefits of fluoride to school-aged children. Cost-effectiveness should be determined based upon the caries rates of the children in the community.
- The safety of fluoride mouthrinse and tablet programs is an important consideration. All personnel mixing and dispensing fluoride should participate in regular training sessions to review proper handling procedures. Fluoride must be stored in a secure place and distribution of mouthrinse and tablets should be monitored. The National Institutes of Health (NIH) publication, "Preventing Tooth Decay: A Guide for Implementing Self-Applied Fluorides in School Settings," is a valuable resource (10).
- The number of children participating in mouthrinse programs can be reported through the Dental Data System. Contact your Area Dental Consultant or Prevention Officer for further information.

3. Topical Fluoride

- Children accessing the dental services via school sealant programs can be provided with topical fluoride according to the needs of the individual child. Target those children with new smooth-surface caries, a history of high caries, or handicapped conditions for APF topical procedures.
- See the section on fluorides and oral prophylaxis for guidelines.

4. Oral Health Education

Education
Programs

- Determine if the health education curricula used by the schools in your service area have oral health components. Schools often welcome assistance from dental professionals when evaluating materials. Visits by dental providers to the classroom build good public relations.
- The Service Unit Dental Program can assist in the implementation of oral health education programs that address topics of particular concern to American Indian/Alaska Native populations, such as:
 - Prevention and cessation of smokeless tobacco use and smoking
 - Prevention/treatment of rapidly progressing periodontal disease
 - Prevention of Baby Bottle Tooth Decay/Early Childhood Caries (BBTD/ECC)
- Classroom instruction by itself should not be expected to influence individuals' behavior such that a group's oral health status improves. However, the value of classroom instruction should not be discounted. It is important that people have sufficient and accurate information about oral disease prevention to make informed decisions regarding personal and community oral health promotion measures.

References:

1. Brunelle JA. Oral health of United States children. The national survey of dental caries in US schoolchildren: 1986-87 National and regional findings. US Department of Health and Human Services 1989; NIH publication No. 89-2247.
2. Weintraub JA. The effectiveness of pit and fissure sealants. J Pub Health Dent 1989;49:317-327.
3. Bohanon HM, Disney JA, Graves RC, Bader JO, Klein SP, Bell RM. Indications for sealant use in a community-based preventive dentistry program. J Dent Ed 1984:45-55.
4. Horowitz HS. Effectiveness of school water fluoridation and dietary fluoride supplements in school-age children. J Pub Health Dent 1989;49:290-296.

5. Leverett DH. Effectiveness of mouthrinsing with fluoride solutions in preventing coronal and root caries. *J Pub Health Dent* 1989:310-315.
6. Clarke JA, MacPherson B, Holmes DR, Jones R. Reducing adolescent smoking: A comparison of peer-led, teacher-led, and expert interventions. *J of School Health* 1986:102.
7. Woolfolk MW, Lang PW, Faja BW. Oral health knowledge and sources of information among elementary school children. *J Pub Health Dent* 1989:39-43.
8. Woolfolk MW, Lang PW, Faja BW. Oral health knowledge and attitudes of elementary school teachers in Michigan. *J Pub Health Dent* 1989:44-50.
9. Kuthy RA, Ashton JJ. Eruption pattern of permanent molars; implications for school teachers in Michigan. *J Pub Health Dent* 1989:49:7-14.
10. Horowitz A. Preventing tooth decay: A guide for implementing self-applied fluorides in a school setting. NIDR/NIH, NIH Publication No. 82-1196; revised December 1981.

Traumatic Injury/Accident Prevention

The incorporation of activities and education targeted at reducing the occurrence of accidental injury to the structures of the head and oro-facial area is essential in any community-based health promotion program. While current legislation is in place to regulate the use of mouth-protecting devices in many organized school sport activities, there is little emphasis placed on injury prevention in the less traditional, non-recognized direct-contact types of athletics. Additionally, the prevention of oral injuries, particularly in children, which may occur through normal everyday activity, is an often overlooked area.

Components which should be addressed within health promotion planning include:

- A cooperative relationship established between the dental department and school officials/athletic programs to help provide properly fitting mouth protectors for students participating in sporting activities. The availability of resources must be a consideration when planning a mouth protector program. Coaches can be particularly effective in encouraging support for mouth protector programs and increasing compliance in use by players.
- Fabrication of impression-made, custom-fit devices affords the highest degree of protection and comfort, although “boil and bite” types of protectors might also be of value in individual application. Studies indicate that the use of mouth protecting devices may also significantly reduce injury risk to the head and neck, as well as to the oral structures, by cushioning blows that might otherwise cause concussions or lead to jaw fractures.
- The use of mouth protecting devices should be stressed, and not just for sports such as football, wrestling, and hockey. Injury to teeth and oral structures in such activities as basketball, soccer, volleyball, weight lifting, rodeo, cycling, etc., could be reduced through the use of mouth guard appliances.
- An educational component should be included in school programs to heighten the awareness of students to the common causes of injury to the teeth and mouth:
 - Slipping/falling on objects or slick surfaces of floor, steps, or sidewalks.
 - Injury caused by pushing impact at water fountains.
 - Playground equipment such as swings, teeter totters, monkey-bars, and slides.

Common Causes
of Injury

- Improper use of teeth for chewing on objects such as ice, hard candies, popcorn hulls, pencils, etc., or use of teeth to cut or pry hard objects.
 - Skateboard, roller/ice skating, tricycle/bicycle accidents.
 - The use of safety belts and child restraint seats/devices should be encouraged in conjunction with community injury prevention programs. Many injuries to the oro-facial area could be reduced or prevented through the use of these methods.
- In addition to the information which is taught on the prevention of trauma through good safety habits, education should also include first aid/emergency care for initial treatment if injury does occur. This is of primary importance for Head Start and other school teachers/personnel and should include procedures to follow for broken, loosened, or avulsed teeth; soft tissue injury and to stop bleeding; and a referral procedure to the nearest clinic or provider for definitive care. Posting of emergency instructions and procedures is recommended for all school settings.

Through the use of the ideas presented, a strong program can be developed to help reduce the incidence of injury to the head and oro-facial area.

References

Hickey JC, et al. The relation of mouth protectors to cranial pressure and deformation. J Amer Dent Assoc 1967;74:735-40.

Ranalli DN, Lancaster DM. Attitudes of college football coaches regarding NCAA regulations and player compliance. J Pub Health Dent 1995;55(3):139-42.

Child Abuse and the Mandated Reporter

Child abuse has recently been recognized as a major risk to the health and well-being of all children, including American Indians/Alaska Natives. Today, child abuse is reported more frequently than in previous decades. In 1991 the U.S. Advisory Board on Child Abuse and Neglect reported that more than 2.5 million American children suffer from child abuse. Identification of children, adults, and elders who have experienced domestic abuse is the first step in preventing further injury.

Most states have identified dentists and dental staff as mandated reporters of child abuse. This means that if you know or suspect that a child is a victim of abuse you must, by law, report it to your local authority.

What is Child Abuse?

The act of inflicting injury or the failure to act so that injury results.

The degree of injury is not the basis for making the decision to intervene.

What is Physical Abuse?

Any act which results in non-accidental physical injury.

This may include severe corporal punishment and can happen when an adult shakes, strikes, or throws a child. It also includes intentional assault such as burning, biting, twisting limbs, or cutting.

Indicators used to distinguish physical abuse from accidental injury include: location and pattern of the injury that is not consistent with an accidental injury, unexplained injury, an injury that is unusual for the specific age group, injuries in different stages of healing, evidence of multiple previous injuries, and delay in seeking care for the child's injury.

What is Physical Neglect?

Neglectful treatment or maltreatment of a child by a parent or caretaker that harms or threatens harm to the child's health or welfare.

General neglect occurs when a parent or caretaker allows a child to be in a situation that could result in physical injury to the child. Severe neglect occurs when a parent or

caretaker causes or permits the child to be in a situation that damages a child's health or welfare.

The extreme or persistent presence of the following factors indicate some degree of child neglect. The factors are lack of adequate medical or dental care, poor personal hygiene, inadequate dress for the weather, poor supervision, unsanitary home conditions, poor nutrition, and apathetic, withdrawn, antisocial, or destructive behaviors.

What is Sexual Abuse?

Sexual assault on or the sexual exploitation of a minor or acts perpetrated for the intent of arousal and/or gratification of either the perpetrator or the child.

Sexual abuse encompasses a wide range of behavior from touching to full intercourse with a minor as young as an infant. It includes physical sexual assault or molestation, lewd or lascivious conduct, activities related to pornography depicting minors, and promoting prostitution by minors. It is estimated that a pedophile will molest approximately 300 times in his lifetime.

Indian reservations and Indian organizations may attract molesters because of their isolation, lack of reporting, and lack of background checks.

Some indicators of child sexual abuse include sexual acting out (sometimes in public) on peers, toys, or pets. Behaviors that may occur during the dental visit are complaints of discomfort in sitting or walking, chronic urinary problems, a display of seductive behavior toward you, fear of going home, fear of shots or other body invasions, and fear of restrooms.

What is Emotional Maltreatment?

Verbal assault like belittling or sarcasm, unpredictable responses, constant family discord and double-message communication that constitute willful cruelty or unjustifiable punishment of a child.

Emotional abuse can lead to severe psychological disorders, handicap development, and lead to behavioral problems including criminal activity.

Emotional Abuse Indicators

Some signs of emotional maltreatment are depression, withdrawal, phobias, and decreased communications. Sometimes these children are clingy, or they might whine, rock, pick at scabs, or make statements like, "I'm bad."

Reporting Child Abuse and Neglect

In most states health practitioners, including dentists and dental hygienists, must report suspected or known child abuse. In some states it is a crime to not report. Mandated reporters may be subject to civil suits if they fail to report.

Usually state law says that suspicions or knowledge of child abuse should be reported to the local law enforcement or child protective service immediately or as soon as practically possible. There is a Federal/Tribal procedure established for those Tribes large enough to have Federal/Tribal law enforcement staff available. Check with your clinic and local law enforcement for established child abuse reporting protocols. There is immunity for mandated reporters.

When a mandated reporter reports child abuse as required by law, the physician-patient privilege (confidentiality) does not apply to information reported following procedures defined in the law. All dental practitioners should be familiar with the state and Tribal laws pertaining to child abuse reporting.

The goal of child abuse reporting is to eliminate the needless suffering many children experience daily. We, as mandated reporters, have an obligation to help our communities interrupt the destructive cycle of abuse in Indian communities.

Introduction: Evaluation of Oral Health Promotion/Disease Prevention Programs

It is critical to evaluate health promotion/disease prevention programs to ensure that resources are being used wisely. Evaluation methods should be defined before the program is implemented, as part of the planning process. Usually the most important expected outcome of a program — improved oral health status of a community — should be evaluated directly using the standard indices, especially DMFT/S and deft/defs and CPITN.

It is, however, also necessary to monitor and evaluate specific activities in order to identify those aspects of a program that are worthwhile and those that should be modified or terminated. A document has been developed to evaluate the efficiency and effectiveness aspects of oral health promotion/disease prevention programs. This document is entitled, *IHS Oral Health Promotion/Disease Prevention Efficiency and Effectiveness Indicators* (March, 1996), and is available through the Dental Field Support and Program Department Section, IHS HQ West (505-248-4175).

Quality Assessment of Oral Health Promotion/Disease Prevention Programs

The IHS quality assurance program includes methodology for evaluating prevention activities provided in the dental clinic and in the community. Thus, preventive services fall into two categories: clinical preventive services and community-based activities.

Assessment of Clinical Prevention Activities

- Review patient records to determine the existence of individualized dental disease prevention plans for each patient. Records will also demonstrate the frequency and appropriateness of clinical preventive services such as routine prophylaxis, fluoride treatments, and sealants. Protocols for the individualized prevention plans and the clinical preventive services are found in the Prevention subsections of Section VII of this document.
- Review data using the Resource and Patient Management System (RPMS) reports to determine the numbers and types of clinical preventive services being performed in the clinic. The Dental Data System package contains many useful reports which can be used for evaluation of a program or for planning purposes.

Under the “Service Minute/Level of Care Reports” (RSVC) one can find several useful options. The “Service Minutes by Dentist” report is available for both direct and contract care programs as RDIR or RCHS. This option shows services and service minutes by Level of Care. Level II services comprise the core of the clinical preventive activities. Comparing the number of Level II services or service minutes to the overall program services and minutes will give a reasonable picture of the clinical prevention effort. In most programs 20 to 30 percent of all service minutes are generated by clinical prevention activities.

Under RSVC one can also find the “Dentist Monthly Activity Report” (DMON), “Dentist Quarterly Activity Report” (DQRT), “Dentist Annual Activity Report” (DANN), and the corresponding reports for hygienists (HMON, HQRT, HANN). These reports will show service minutes for each Level of service and give the percentages of time devoted to each level. These reports also give specific information about the number of procedures provided by ADA code.

- Reports may also be produced by Area Offices, Headquarters Offices, or other agencies and programs.
- Information can be obtained by local program managers using the TECH option of the DDS package. To enter this option the following path is used:

Under DDS Main Menu select QAT (Quality Assurance Tracking)

Under QAT select TECH (Technical QA Functions)

Under TECH select PADA (Patient Listing by a Range of Procedure Codes)

The PADA function can give specific information linked to one or more procedure codes. For example, information can be obtained about numbers of patients receiving sealants or topical fluoride treatments during a given time period. Dividing the total number of patients receiving a procedure by the total number of active patients during the past three years provides information about the user population which can be reviewed periodically.

- Results of the most recent IHS Patient Oral Health Survey may be reviewed to determine if prevention services are consistent with community needs. Local policies and procedures can also be reviewed.
- Determine if high-risk patients receive the highest priority for both clinical and preventive services. Evaluate the effectiveness of the clinic recall system.
- The 437 Oral Health Objectives Monitoring Module may be utilized to monitor progress toward meeting a list of national health objectives. This module, which is available to all IHS, Tribal, and Urban dental clinics using RPMS, provides local program officials with valuable information on the effectiveness of clinical and prevention efforts.
- Use the HP/DP Efficiency/Effectiveness indicators developed by the OHP/DP committee. For a copy of the document contact the Area Dental Consultant, Area Prevention Officer, or HQW Dental Field Support and Program Development Section.

Assessment of Community-Based Prevention Activities

- Review the “Evaluation of Community Involvement In Oral Health Programs” subsection of the quality assessment section (Section VII) of this guide. This

document gives important information about community-based prevention activities which should be a part of every dental program. Some of the criteria found in this section are also included below.

- Evaluate the clinic Policy and Procedure Manual for inclusion of community-based dental disease prevention programs. Review community dental disease prevention plans and related materials.
- Review dental department and/or Service Unit Dental Program reports. The frequency of reports is usually determined by local program managers. Review information reported on CBARS (Community-Based Activity Reporting System). Evaluate appropriateness of community-based activities.
- Review documentation related to the existence and effectiveness of a community water fluoridation program. Determine whether a community or Service Unit water fluoridation team exists. Review information on the effectiveness of the team by reviewing reports or minutes from meetings.
- Review fluoridation reports generated by the Dental Data System fluoridation reporting module. Review fluoridation reports generated by Area Offices or national reports.
- Review information about local schools, percentages of Native American enrollment, school-based Dental Programs, Head Start programs, toothbrushing programs, classroom activities related to dental disease prevention, fluoride tablet or rinse programs, and other activities.
- Review data on dental disease rates and “437 Objectives.” Determine if community prevention activities are adequate and appropriate.
- Review collaborative efforts between the Dental Program and other health programs such as WIC, Nutrition, Medical, Child Welfare, Mental Health, and Counseling.
- Review collaborative efforts with Tribal or community institutions, state and Federal programs, IHS programs, higher learning centers, and concerned groups of people.
- Review efforts by the Dental Program to improve patient satisfaction, meet community needs, and provide long-term planning for the Dental Program.
- Use the OHP/DP Efficiency/Effectiveness indicators developed by the OHP/DP committee. For a copy of the document contact the Area Dental

Collaborative
Efforts

Patient Satisfaction

Additional
Resource
IV-155

Oral Health Promotion/Disease Prevention

Consultant or Area Prevention Officer or HQW Dental Field Support and
Program Development Section (505-248-4175).

Documentation of Clinical and Community Preventive Services

Clinical Preventive Services

The documentation of clinical preventive services is accomplished through the correct use of examination forms and progress notes. The IHS Dental Examination Record (Form 42-1) and Services Provided-Progress Notes (Form 42-2) are designed to make the documentation of clinical prevention activities relatively simple.

The determination of a patient's risk for dental disease accompanied by recommendations and/or clinical procedures designed specifically for that patient is referred to as an "individualized prevention plan." Part IV, the Prevention Assessment, of the Dental Examination Record, is generally completed after the clinical findings of Part III have been documented. It is used to assess the need for prevention activities and to develop an Individualized Prevention Plan.

The first half of Section IV cues the examiner to inquire about the status of water fluoridation in the patient's community, the use of fluoride toothpaste, the use of other fluoride supplements, adequacy of oral hygiene, and tobacco use.

The second half of Part IV permits the examiner to record information about specific activities that would benefit the patient. These activities may include the use of topical fluorides, prescription of fluoride tablets/drops, application of sealants, provision of oral hygiene instruction, and the provision of other patient education. This section also allows the program to record a specific target group into which the patient may be placed for future reference, recall, or some other preventive activity.

The completion of Part IV of the Examination Record along with appropriate oral hygiene instructions and documented recommendations within the Progress Notes constitutes the "individualized prevention plan." A code of "1330" may be used for data entry.

Detailed information about how to complete Section IV as well as other parts of the Examination Record can be found in the document titled *User Information Package For The Indian Health Service Dental Examination Record, Form IHS 42-1*. This document is distributed by the Dental Field Support and Program Development Section (Headquarters West).

Along with the completion of Section IV of the Examination Record, the Progress Notes can provide important documentation of clinical preventive services. In this part of the patient record the clinician can describe prevention activities in great detail or very briefly, depending on the circumstances and need for future reference. Procedure codes exist for, and should be entered, for each preventive activity. A list of procedure codes can be obtained from the local Dental Program manager or from the Dental Field Support and Program Development Section.

Additional information about the documentation of clinical preventive services can be found in Section VII of this guide. This section gives information about specific criteria used to assess the adequacy and appropriateness of clinical prevention activities.

Community-Based Prevention Activities

The documentation of community-based prevention activities is important, because these services have a direct impact on the health and well-being of the community members that we serve. These services are a vital component of most community-based dental programs.

The documentation of community-based prevention activities may be accomplished through reports, program plans, minutes of meetings, direct or indirect program reviews, or by the input of data into the DDS package.

As discussed in the preceding text, reports can be used to assess a community prevention effort. They will show, in general or specific terms, who provided what kind of activity, when the activity was performed, who participated, and much more. There is considerable flexibility in this method of documentation, giving the writer unlimited options for documenting his/her efforts.

Reports can demonstrate a strong community prevention effort during a program review. They can also be used to satisfy Joint Council on Accreditation of Healthcare Organizations (JCAHO) requirements for meeting national standards, or to monitor the progress of a broad-based intervention. Regular written reports in combination with locally-obtained data can become an effective instrument for measuring change in a clinical or community program.

Program Plans

Similarly, program plans and community dental disease prevention plans can be developed locally to suit the needs of a community with the same degree of flexibility as reports. A program plan differs from a report in that it contains information about tentative events or activities. A sound program plan uses past history, present circumstances, and available resources as an information base to chart a course for

improving the program. Input from Tribal officials and community members is crucial for successful implementation.

The development of a community disease prevention plan is an activity which can be compared to the individualized dental disease prevention plan found in a patient's dental record. The community should be assessed before developing a disease prevention plan and this information should be documented. A number of formats have been developed in the past for the purpose of evaluating a community prior to developing a community prevention plan. One such resource is the *Partners in Prevention* document which is available through the Dental Field Support and Program Development Section, HQ West. This document can be used as a resource or as a guide to developing a large scale community prevention plan.

Monitoring of Oral Health Objectives for American Indians and Alaska Natives

In 1992, important amendments to the reauthorization of Public Law 94-437 were passed by the Congress which may substantially affect IHS and Tribally-managed health programs. The law mandates the IHS to focus on specific objectives for improving the health of Native Americans, including Urban groups. Congress has selected 61 health outcome objectives from the U.S.P.H.S. Year 2000 Objectives for the Nation. Eight (8) of the 61 objectives directly relate to oral health improvement.

The law requires the IHS to gather baseline data for each objective for each Tribal entity and to monitor progress on an annual basis. The IHS also must develop a method to translate each program's deficiencies into resource needs for funding by the Congress. Therefore, the IHS Dental Branch has developed an affordable and widely applicable method for all local Dental Programs to begin monitoring the PL 437 objectives, as well as other Year 2000 goals. It involves the existing Dental Data Reporting System for reporting dental clinical workload data using ADA procedure codes. Unique dental procedure codes have been added to the system for this purpose.

A module has been developed for the dental RPMS software which will enable each program to monitor trends locally, without depending on periodic reports from the central database. Non-RPMS clinics will continue to submit data to Unicor and depend solely upon reports from the central database. However, special reports will be created to provide monitoring information for each program on an annual basis.

Dental auxiliaries must play a pivotal role in monitoring the objectives. *Dental hygienists and dental assistants should acquire adequate knowledge and skill to assess the status of patients relative to each of the objectives.*

Oral Health Objectives for Native Americans by the Year 2000

1. Reduce dental caries so that the proportion of children with one or more caries (in permanent or primary teeth) is no more than 45 percent among children aged 6 through 8 and no more than 60 percent among adolescents aged 15.
2. Reduce untreated dental caries so that the proportion of children with untreated caries (in permanent or primary teeth) is no more than 20 percent among children aged 6 through 8 and no more than 40 percent among adolescents aged 14-15.
3. Increase to at least 50 percent the proportion of children who have received protective sealants on the occlusal surfaces of permanent molar teeth (monitoring ages 6-8 and 14-15 year-olds).
4. Reduce the prevalence of gingivitis among individuals aged 35 to 44 to no more than 50 percent.
5. Reduce destructive periodontal disease to a prevalence of no more than 15 percent among individuals aged 35 to 44 years.
6. Increase to at least 45 percent the proportion of individuals aged 35 to 44 who have never lost a permanent tooth due to dental caries or periodontal disease.
7. Reduce to no more than 20 percent the proportion of individuals aged 65 and older who have lost all of their natural teeth.
8. Increase to at least 65 percent the proportion of the American Indian and Alaska Native parents and caregivers who use feeding practices that prevent baby bottle tooth decay.

Procedures for Monitoring the PL 94-437 Oral Health Objectives:

Goal 1: Reduce the prevalence of tooth decay among children.

Reported for each “caries free” dental patient 5-19 years during the First Visit (0000) of each fiscal year. Caries free means the patient has *no* decayed, missing (due to caries) or filled teeth. Use **special code IH71** if:

- the 5-9 year old patient is caries free in the primary or mixed dentition, including permanent teeth.
- the 10-19 year old patient is caries free in the permanent dentition only.

Goal 2: Reduce the prevalence of untreated tooth decay among children.

Reported for each dental patient age 5-19 who is found to have one or more teeth which *need treatment* (a filling or an extraction) due to decay at the First Visit (0000) of the fiscal year. Use **special code IH72** if:

- the 5-9 year old patient needs treatment of the *primary molars or any permanent teeth*.
- the 10-19 year old patient needs treatment in *any permanent teeth*.

Arrested caries and lesions in the primary teeth which you would not normally treat should not be classified as “untreated” teeth.

Goal 3: Increase the number of children who receive sealants on the occlusal surfaces of permanent molar teeth.

Reported for each patient age 5-19 who has received an occlusal sealant on at least one permanent molar. Use **special code IH73** at the First Visit (0000) or at a subsequent visit, but only once per fiscal year for a patient who has received a molar sealant. For example, if the first sealant is placed on a molar during a revisit (0190), the IH73 code should be reported for that visit.

Goal 4: Reduce the prevalence of gingivitis among adults.

Monitored on patients age 15 to 45 years of age during their *first routine dental exam* (code 0150 or 0120) of each fiscal year, based upon the CPITN scoring system and using a given definition of an “acceptable” level of periodontal health. Use **special code IH74** if the patient is found to have at least 3 sextants with a CPITN score of “0” and no other

Code IH74

sextants have a score greater than “2.” In other words, at least half the mouth is healthy and no pathological pockets exist.

Goal 5: Reduce the prevalence of destructive periodontitis among adults.

Monitored on patients age 15 to 45 years of age during their *first routine dental exam (code 0150 or 0120) of each fiscal year*, based upon the CPITN scoring system and using a given definition of destructive periodontitis. Use **special code IH75** if the patient has deep (6mm or greater) pocketing present, indicated by a score of CPITN of “4” in at least one sextant of the mouth. This includes findings on teeth which may need extraction due to periodontitis.

Goal 6: Increase the number of adults who have not lost any permanent teeth to dental caries or periodontal disease.

Monitored on all patients 15 to 45 years old at the First Visit of each fiscal year. Use **special code IH76** if the patient is found to have one or more teeth missing due to tooth decay or periodontal disease. Use this code for the First Visit if a tooth is already missing or at a subsequent revisit if tooth loss first occurs at that appointment.

Goal 7: Reduce the number of adults who have lost all of their teeth.

Reported only once for each dental patient age 15 years and over who becomes edentulous at this clinic. Use **special code IH77** for the visit when the patient has the last of his/her remaining teeth extracted. This code monitors the incidence rate of new edentulous patients and *not* patients who are already edentulous.

Goal 8: Increase the number of parents and caregivers who use feeding practices that prevent rampant tooth decay in pre-school children (under age 5).

Monitored among parents and adult caregivers when they or their preschool-aged children seek dental care and essential knowledge is assessed and/or provided by dental staff. *Reported only once per individual.* Use procedure code **9340 (Dental Visit, Prenatal Mother)** or **9341 (Dental Visit, Parent/Caregiver)** respectively, if their knowledge of infant feeding practices is assessed and preventive information is provided when needed.

This system actually monitors the contribution of the dental staff to ensure that targeted individuals have adequate knowledge. The use of these codes will be tracked over time in relation to monitoring data on the prevalence of BBTD/rampant caries. Therefore, the **0003 code BBTD/Rampant Caries** should be used at the First Visit for each patient

Code 0003

under age 5 years who has caries of anterior primary teeth and posterior proximal surface caries in two or more quadrants.

Other U.S.P.H.S. Year 2000 Oral Health Objectives recommended for monitoring by IHS/Tribal/Urban community Dental Programs (in addition to the PL 437 objectives)

Goal 9: Reduce oral cancer and reduce tobacco use as a risk factor.

Each Dental Program's attention to this goal will be monitored during periodic IHS Quality of Care Evaluation procedures. The following information should be obtained during chart reviews: 1) evidence that a soft tissue exam was provided, as well as follow-up of suspicious lesions; 2) patients were assessed regarding tobacco use (present/past) and assistance was provided to those want to quit.

During routine exams, the patients tobacco use should be indicated in the preventive assessment on the IHS 42-1 form. If you provide information and/or follow-up, use the tobacco education code **1320 (Tobacco Use Intervention Activity)**.

Goal 10: Increase the number of dental patients with access to optimally fluoridated drinking water.

Most of the Native American population having access to fluoridated water is being monitored on a community-wide basis through the IHS Water Fluoridation Tracking System and Quality of Care evaluations. These data, if available, may also be used to document the status of a dental patient's drinking water supply.

During routine exams (**0150, 0120**) of patients under the age of 15, the fluoride level of their home water supply should be assessed and documented on the Preventive Services Assessment section of the IHS 42-1 oral exam form.

Goal 11: Increase the number of children who receive a systemic or self-applied topical fluoride.

During routine dental exams on patients under age 20, the need for supplemental fluoride coverage should be determined according to their caries risk category and documented on the Preventive Assessment Section of the IHS 42-1 form. Prescribed fluoride regimens should be incorporated into the written treatment plan.

Code 1207 and
Code 1208

Use procedure code **1207 (Prescribe Systemic Fluoride)** when a fluoride supplement is needed, and use code **1208 (Prescribe Self-applied Topical Fluoride)** when fluoride toothpaste and/or mouthrinse is provided. Report these codes only once per patient per fiscal year.

Goal 12: Increase the number of school children who receive an oral exam and treatment annually.

All patients entering school programs for the first time (e.g., Head Start, kindergarten, or first grade) and receiving an oral exam will be monitored.

The use of exam codes **0150 (Initial Exam)** and **0114 (for Group Screening Exam)** will be tracked among children under age 10. For Head Start children, use code **0004** in addition to the exam code to indicate this targeted age group.

Goal 13: Monitor the number of patients examined in long-term care facilities.

Recent Medicaid, Medicare, and JCAHO standards call for residents of nursing homes and skilled nursing facilities to receive a health “assessment” and any needed care, including emergency and dental services, within 90 days.

Use **special code 9344 (Nursing Home Patient)** to designate this special patient in addition to the screening exam code (**0114**) or exam codes (**0150, 0120, 0140**). This special code should be used only once per fiscal year.

Goal 14: Monitor the number of student athletes who receive protective mouth guards.

Schools are encouraged to make mouth protectors available to student athletes. The role of the Dental Program in providing oral protection will be tracked.

Use procedure code **9941 (Athletic Mouth Guard)** for patients who received a protective mouth guard at the first visit or subsequent visit, but only once during the fiscal year.

Code 9941

Goal 15: Monitor number of children with cleft lips and/or palates who receive an oral exam.

Use **special code 9345 (Cleft Lip/Palate Patient)** on patients 0 to 19 years who have cleft lips and/or palates and who receive an oral exam (**code 0150, 0120**). This code should be used at the First Visit or subsequent visit, but only once per fiscal year. This code will be used to track those handicapped patients who may need to be referred/deferred for special services.

Code 9345

Procedure Codes for Monitoring the PL 94-437 and Other Year 2000 Oral Health Objectives

Monitoring Codes	Code	Description of Procedure
	0000	First Visit
	0003	BBTD/Rampant Caries Dental Patient
	0150	Oral Examination, Initial
	0120	Oral Examination, Periodic
	0114	Screening Oral Exam
	0140	Oral Examination, Emergency
	0190	Revisit
	1207	Prescribe Systemic Fluoride Supplement
	1208	Prescribe Self-Applied Topical Fluoride
	1340	Tobacco-Use Intervention Activity
	IH70	Patient Assessed, No Other Codes Apply
	IH71	Caries-Free Patient
	IH72	Patient with Untreated Tooth Decay
	IH73	Patient with Permanent Molar Sealant(s)
	IH74	Patient with Adequate Periodontal Health
	IH75	Patient with Destructive Periodontitis
	IH76	Patient with Missing Tooth
	IH77	Patient Became Edentulous
	9340	Dental Visit, Pre-natal Mother
	9341	Dental Visit, Parent/Caregiver
	9344	Nursing Home Patient
	9345	Cleft Lip/Palate Patient
	9941	Athletic Mouth Guard
	9990	Planned Treatment Completed